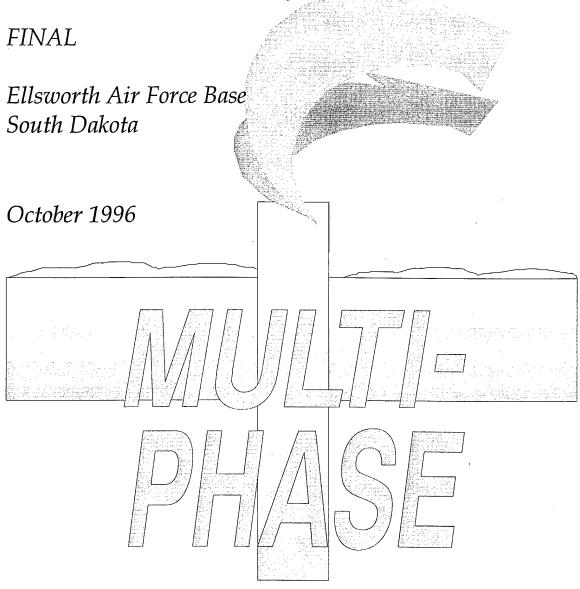
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Ellsworth AFB Pride Hangar

Multi-Phase Pilot Test Technology Evaluation Report



Prepared for:

U.S. Army Corps of Engineers Omaha District

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U.S. Army Corps of Engineers, Omaha District ATTN: CEMRO-ED-EB (Robert Zaruba) 215 North 17th Street Omaha, Nebraska 68102-4978

SUBJECT: Contract No. DACA45-93-D-0027, Delivery Order No. 27, Mods 04

and 05; Final Ellsworth AFB Multi-Phase Pilot Test Technology

Evaluation Report, Pride Hangar Site

Dear Mr. Zaruba:

Enclosed are two (2) copies of the final Ellsworth AFB Multi Phase Pilot Test Technical Evaluation Report performed at the Pride Hangar Site. I have forwarded two copies to Ms. Margaret Calvert at ACC CES/ESVW, Langley AFB, two copies to Mr. Dell Petersen at Ellsworth AFB, one copy to Peter Ismert at EPA Region VIII, one copy to Mr. Ron Holm at the State of South Dakota, two copies to Mr. Keith Anderson at RUST, and one copy to Mr. Robert Todd at EA.

If you have any questions regarding this deliverable please contact me at (916) 857-7281 or Mr. Bill BuChans at (423) 483-9870.

Sincerely,

Francis E. Slavich, P.E.

Program Manager

c: Ms. Margaret Calvert, ACC CES/ESVW, Langley AFB (2)

Mr. Dell Petersen, Ellsworth AFB (2)

mandhrusteren tor

Mr. Peter Ismert, US EPA (1)

Mr. Ron Holm, SDDENR (1)

Mr. Keith Anderson, RUST (2)

Mr. Robert Todd, EA (1)

Bill BuChans, Radian (1)

James Machin, Radian (1)

Suzanne Sellers, P.E., Radian (1)

Project File, 612-001 (1)

ELLSWORTH AFB MULTI-PHASE PILOT TEST TECHNOLOGY EVALUATION REPORT FOR PRIDE HANGAR SITE

at
Ellsworth Air Force Base
South Dakota

FINAL

Prepared for:

U.S. Army Corps of Engineers Omaha District ATTN: CEMRO-ED-EB 215 North 17th Street Omaha, Nebraska 68102

Prepared by:

Radian Corporation 1093 Commerce Park Drive, Suite 100 Oak Ridge, Tennessee 37830 Doc. #D960711.4

October 1996

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ACRONYMS

ACC Air Combat Command

AFB Air Force Base

BGS Below Ground Surface

BTEX Benzene, Toluene, Ethylbenzene, and Xylenes

CERCLA Comprehensive Environmental Response, Compensation and Liability Act

DCA Dichloroethane
DCE Dichloroethylene

DNAPL Dense Nonaqueous Phase Liquid

EPA U.S. Environmental Protection Agency

ESVE Enhanced Soil Vapor Extraction FPTA Fire Protection Training Area

GAC Granular Activated Carbon

HQ Headquarters

IRA Interim Remedial Action

LNAPL Light Nonaqueous Phase Liquid MCL Maximum Contaminant Level

MPE Multi Phase Extraction

O&M Operation and Maintenance

OU Operable Unit

PCE Tetrachloroethylene

PREECA Presumptive Remedy Engineering Evaluation/Cost Analysis

PVC Polyvinyl Chloride

RI Remedial Investigation SVE Soil Vapor Extraction

TCE Trichloroethylene

TPE Two-Phase Extraction

USAF U.S. Air Force

VOA Volatile Organic Analysis
VOC Volatile Organic Compound

μg/L Micrograms per Liter

1.0 INTRODUCTION

In May 1996, Ellsworth Air Force Base (AFB), in Rapid City, South Dakota, and Radian Corporation (Radian) completed a three-day pilot treatability test at the Pride Hangar Site of Operable Unit 11 (OU-11) using Two-Phase Extraction (TPE), one of the Multi-Phase Extraction (MPE) technologies. This report provides a summary of the methodology used during the test, the test results, and base-specific recommendations.

1.1 Purpose/Objectives

On 5 May 1995, Headquarters (HQ) Air Combat Command (ACC) published United States Air Force Presumptive Remedy Engineering Evaluation/Cost Analysis (PREECA) (U.S. Air Force [USAF], 1995) as a standardized decision framework specifying the criteria and associated decision logic necessary for implementing a nontime-critical removal action for various commonly used technologies. This decision framework, developed by Radian in conjunction with the U.S. Army Corps of Engineers and the USAF, combines the standard Comprehensive Environmental Response, Compensation, and Liability Act (CERLCA) nontime-critical removal action process with the concept of presumptive remedies and a "plug-in" logic tree approach. The result is a "generic" remedy selection document for all USAF installations that facilitates early and substantial risk reduction at USAF sites. PREECA applies only to a closely defined subset of conditions that the USAF has found to be common and that pose sufficient risk to justify nontime-critical removal actions. This methodology was not intended to be used at sites where the need for cleanup actions is not readily apparent.

PREECA focuses on remedies that can satisfy the majority of common USAF contamination situations, namely in situ bioventing, soil vapor extraction (SVE), groundwater containment, and capping. However, PREECA is intended to be updated as new, successful remedies are established.

The USAF is currently gathering extensive cost and performance data at a number of contaminated sites for addition of the MPE technologies which include TPE, low vacuum dual-phase extraction (LVDPE) and high vacuum dual-phase extraction (HVDPE). As part of this effort, HQ ACC has contracted with Radian through the Omaha District Corps of Engineers to evaluate the MPE technologies for inclusion in the USAF PREECA. Radian, in conjunction with the USAF, developed a remedy profile for MPE as part of the PREECA effort.

This report presents the results of the TPE pilot test conducted at Ellsworth AFB in May 1996. It compares the pilot test results to PREECA's remedy profile for MPE and demonstrates that TPE is an effective technology for use at Ellsworth AFB. In addition, it presents data on additional objectives for the pilot test, which were to:

- Demonstrate the contaminant removal effectiveness of the TPE technology;
- Determine the feasibility of installing a fullscale system;
- Collect sufficient engineering data to facilitate the design, installation, and operation of a full-scale extraction and treatment system; and
- Assist in the prevention of contaminant migration, thereby minimizing the threat of exposure to human health and the environment.

TPE was selected for testing at the OU-11 Pride Hangar Site because data in the 1995 OU-11 RI [Engineering, Science, and Technology (EA), 1995] indicated a large "hot spot" of groundwater contamination at the Pride Hangar. Data from the OU-11 RI also suggested a low-moderate saturated zone permeability that may limit the effectiveness of groundwater pump and

treat. The TPE technology is designed to enhance control of groundwater plumes in lowto moderate-permeability formations, as well as to remove contaminants from the saturated and vadose zones.

1.2 Site Background

The Pride Hangar is located in the middle of the flightline area of Ellsworth AFB as shown in Figure 1-1. This site was used as a maintenance hangar, resulting in significant soil and groundwater contamination.

Previous field activities in the area have included installation and sampling of monitoring wells and water level measurements. Data collected from these activities, in addition to data from this project, have been used to characterize the subsurface features and the nature and relative extent of contamination at the site.

1.2.1 Subsurface Features

The Pride Hanger area is underlain by approximately 25 to 30 feet of soil (alluvium) that overlies weathered shale and shale bedrock of the Pierre Shale formation (Figure 1-2). The overlying soil consists of interbedded clay, sand and gravel. The sand units are poorly sorted and mixed with clay and gravely materials. The sand and clay units were expected to have low to moderate permeabilities based on visual inspection. However, the clayey sand and gravel unit present within the saturated alluvium are of relatively high permeability.

The upper portion of the Pierre Shale is weathered and consists of variably fractured light olive gray to dark olive gray clay, which increases in competence with depth. Weathered shale is greater than 5 feet thick in the study area (work in the area of the Pride Hanger did not delineate the depth at which competent shale is encountered). The permeability of the weathered and fractured shale is likely to be low.

Extraction well EW-1 was completed within the overlying alluvium and the weathered shale bedrock. It is screened from 23.5 to 33.5 feet below ground surface (BGS). Depth to groundwater in the well was approximately 20 feet BGS. The saturated alluvial thickness ranges from 8 to 10 feet in the extraction well and adjacent piezometers (P-1, P-2, and MW941103). Hydraulic conductivity in the saturated zone is relatively high in EW-1 (1.4 × 10-2 centimeters per second [cm/sec]) based on a slug test run by Rust environment and infrastructure (Rust) after the conclusion of the TPE test. Groundwater flow direction is to the southeast in the Pride Hanger area.

Data from slug tests conducted by EA, and Rust indicate the geometric mean hydraulic conductivity for the shallow aquifer at Ellsworth AFB is 1.1×10^{-4} cm/s. Figure 1-3 shows the distribution of hydraulic conductivities for the saturated zone across the base. These slug tests were conducted on numerous wells in various parts of the Base. Most wells were screened across the entire saturated zone of the shallow aquifer. This aquifer is quite variable across the Base and consists of heterogeneous mixtures of alluvial material (clay, silt, sand, and gravel) and/or weathered and fractured shale. This results in a rather large spread of hydraulic conductivities as shown in Figure 1-3.

1.2.2 Nature and Extent of Contamination

The 1995 RI identified this site as containing significant volatile organic compound (VOC) contamination in the groundwater. The site is contaminated with a combination of VOCs (primarily TCE up to 7,000 micrograms per liter $[\mu g/L]$ and purgeable JP-4 up to 2,500 $\mu g/L$), which are present mostly in the saturated zone.

By using slug test data from OU-9 (3,500 feet to the south) it was assumed that this site had low hydraulic conductivities. As the TPE test showed, this site was one of the more permeable sites on base. It was also noted that groundwater concentrations were significantly lower during the test than was presented in the 1995 RI. Samples collected from EW-1 during the test indicated TCE concentrations of 97 to 410 $\mu\text{g}/L$.

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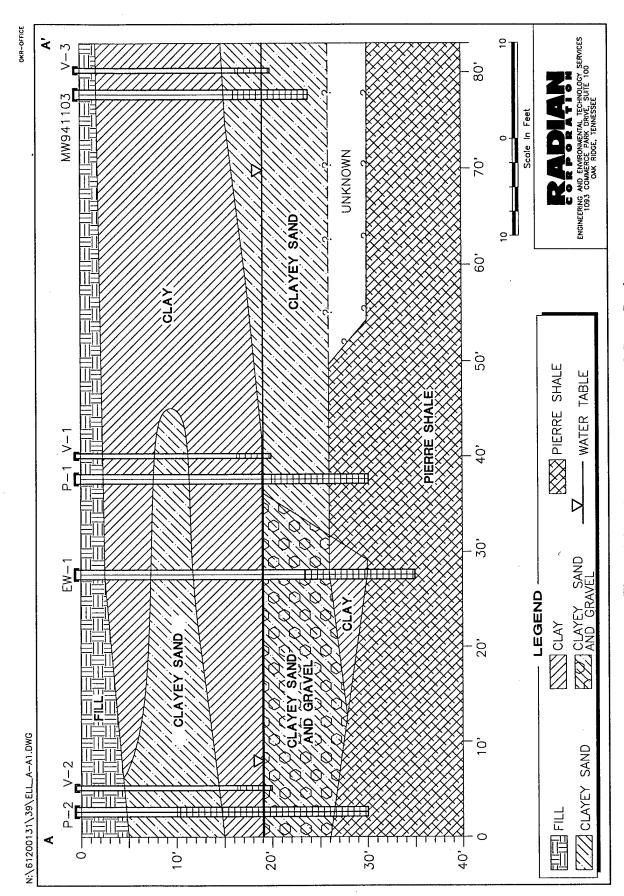


Figure 1-2. Pride Hangar Conceptual Cross-Section

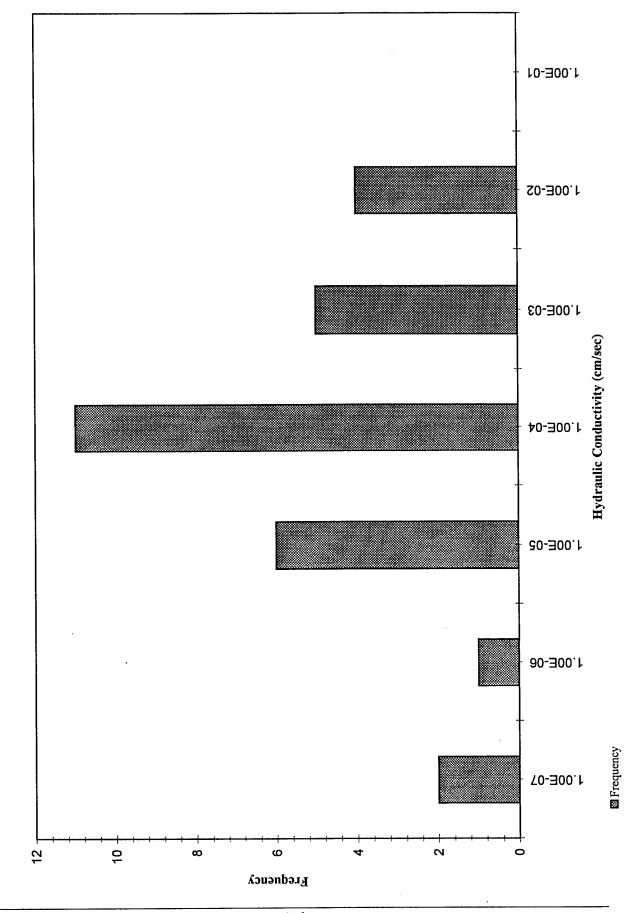


Figure 1-3. Histogram of Hydraulic Conductivities

2.0 TPE EXTRACTION TEST METHODOLOGY

The following information on the technical approach and the sampling and analytical methodologies is a summary of the *Ellsworth AFB Two-Phase Extraction Pilot Test Work Plan* (Radian Corporation, 1996). Additional details are contained in that document.

2.1 Test Procedures

The pilot-scale test of the Two-Phase Extraction system consisted of a three day test conducted in OU-11 on a new extraction well near MW 941103. The test was completed by 16 May 1996. All activities (equipment monitoring, sample collection, sample control, and sample analysis) were conducted in accordance with the procedures and protocols described in the U.S. Environmental Protection Agency (EPA)approved Ellsworth AFB Quality Assurance Program Plan (QAPP), the Site Safety and Health Plan (SSHP) included in the work plan, and the OU-11 SSHP. The locations of the test wells and monitoring points are shown in Figure 2-1. Well, piezometer, and vapor point characteristics are summarized in Table 2-1. Well logs are included in Appendix A.

2.1.1 Installation of Extraction Well, Piezometers, and Vapor Probes

2.1.1.1 Extraction Well

The extraction well (EW-1) was installed in order to test TPE for the removal of TCE and other volatile organic compounds from groundwater in the Pride Hanger area. The location was selected based upon limited data from previous drilling in the area. Information was not available on the depth to the top of the weathered bedrock or the hydraulic conductivity of the saturated alluvium at the test site prior to installation of the well. Well placement was located in an area of elevated TCE concentrations in groundwater identified in the OU-11 RI report (EA, 1995).

The well was installed on 10 and 11 May 1996 using a hollow stem auger drilling rig with 10inch outside diameter augers. Soil samples were collected continuously so that a lithologic log could be prepared (Appendix A). The well was constructed with 4-inch diameter polyvinyl chloride (PVC) well casing and screen. The well casing, sand pack, and bentonite seal were installed through the augers to ensure the stability of the well bore. The well screen was placed in the upper portion of weathered shale and in the saturated section of alluvial deposits. The 10-foot long screen was placed from 23.5 to 33.5 feet below ground surface (BGS). A lithologic log and completion detail are contained in Appendix A.

After the well was completed, it was developed to remove silt and clay and ensure communication with the aquifer. The well was purged using a disposable bailer. Water quality was monitored during development by visually observing the silt and clay content of the water and by pH and turbidity measurements. Development was judged complete when the pH was stable and turbidity of the water had decreased to the satisfaction of the supervising geologist. Development logs are contained in Appendix A.

Soil samples collected during drilling of the extraction well indicated that the saturated alluvial sediments at the site were similar in composition to those found in other areas of the installation.

2.1.1.2 Piezometers and Vapor Probes

Piezometers: The piezometers (P-1 and P-2) were installed in order to monitor the response of the aquifer to the test. Piezometers were located at distances of 11.6 and 21.3 feet from extraction well EW-1. An existing monitoring well, MW941103 was located 48.9 feet from EW-1. The locations were chosen such that data from the wells provided data on the response of the saturated zone to TPE. Well screens were placed within the saturated soils and extending up into the unsaturated zone.

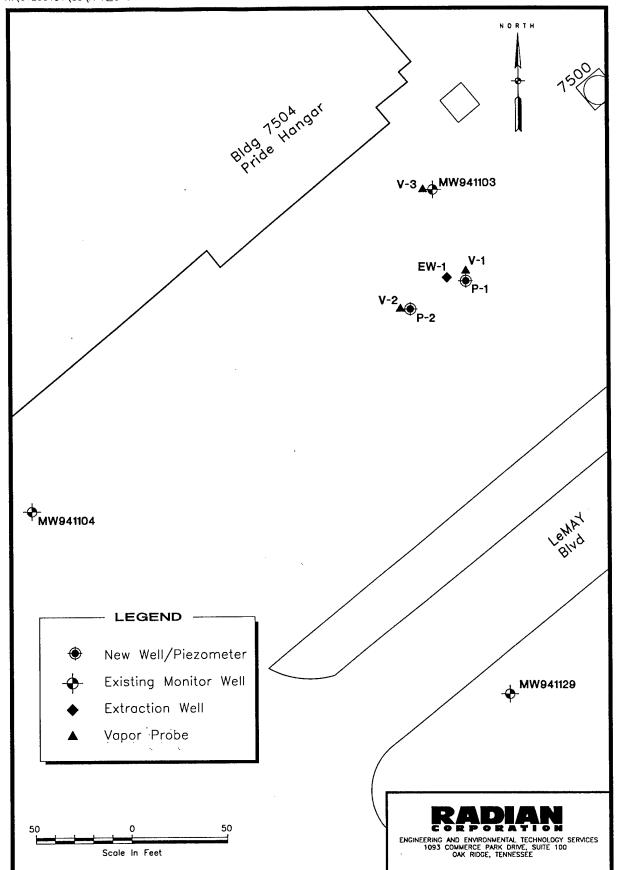


Figure 2-1. Pride Hangar Test Well and Monitoring Points, Ellsworth AFB

Table 2-1
Summary of Wells and Monitoring Point Characteristics

Well/Piezometer ID	Used to Monitor	Total Depth (ft BGS)	Screened Interval (ft BGS)	Approximate Distance from EW-1 (FT)
V-1	Induced Vacuum	16	11-16	10.5
V-2	Induced Vacuum	16	11-16	23.3
V-3	Induced Vacuum	17	12-17	49.4
P-1	Water Level	30	20-30	11.6
P-2	Water Level	30	9-29	21.3
MW 941103	Water Level	23.3	13-23	48.9
EW-1	Extraction Well	33.5	23.5-33.5	

BGS = Below Ground Surface

The piezometers and vapor probes were installed between 10 and 13 May 1996 using a hollow stem auger drilling rig with 6-inch outside diameter augers. Soil samples were collected from selected intervals so that lithologic logs could be prepared and for headspace screening (Appendix A).

The piezometers were constructed with 2-in. diameter polyvinyl chloride (PVC) well casing and screen. The casing, sand pack, and bentonite seal were installed through the augers to ensure the stability of the well bore. The details of the wells are contained in the completion logs in Appendix A. The screen lengths were 10- and 20-foot long screen in piezometers P-1 and P-2, respectively.

After the piezometers were completed, they were developed to remove silt and clay and ensure communication with the aquifer. The wells were first surged with a 2-inch, vented, surged block to loosen up the fine material from the sand pack so that it could be removed. The piezometers were then purged using a disposable bailer. Water quality was monitored during development by visually observing the silt and clay content of the water and by pH and turbidity measurements. Development was judged complete when the pH was stable and turbidity of the water had decreased to the

satisfaction of the supervising geologist.

Development logs are contained in Appendix A.

Vapor Probes: Three vapor monitoring probes (V-1, V-2, and V-3) were installed in the unsaturated (vadose) zone to measure the induced vacuum. The probes had 5 feet of screen set at approximately 11 to 16 feet BGS. The probes were located at distances of 10.5, 23.3, and 49.4 feet from EW-1. Figure 2-1 shows the locations of the extraction well, piezometers, and vapor probes.

The vapor probes were constructed with 1-inch diameter PVC well casing and screen. The well casing, sand pack, and bentonite seal were installed through the augers to ensure the stability of the well bore. The details of the wells are contained in the completion logs in Appendix A.

2.1.2 Test Equipment

The test was conducted using a trailer-mounted, 25-horsepower, high-vacuum extraction unit capable of producing an air flow rate of 300 actual cubic feet per minute (acfm) at 25 inches of mercury (pump rating on suction side). The system is shown in schematic in Figure 2-2. Extracted groundwater was discharged to temporary storage tanks, and extracted vapor was discharged to the atmosphere.

The wastewater was then transported and discharged to the OU-1 treatment plant. Procedures followed during the testing are summarized in the work plan described in Section 2.0.

2.2 <u>Sampling and Analytical</u> <u>Methodologies</u>

All sampling and analytical procedures (except where noted) were conducted in accordance with procedures and protocols described in the EPA-approved Ellsworth AFB QAPP. Sampling locations and frequency are summarized in Table 2-2.

2.2.1 Sampling Methodology

System parameters and ambient air conditions were measured through various vacuum gauges, meters, and thermometers included on the TPE trailer. Groundwater drawdown in the observation wells was measured using an electronic water level meter, and induced vacuum was measured using Magnehelic® gauges. Data collected were recorded on field data tables (Appendix B).

Baseline groundwater samples from EW-1 were collected prior to TPE testing in 40-milliliter (mL) volatile organic analysis (VOA) vials using a dedicated Teflon® bailer. Prior to collecting the baseline samples, three well volumes of water were purged from the well. Approximately one hour after ending the test, post-test groundwater samples were collected using the dedicated bailer.

Water samples collected during the test were taken directly from the TPE trailer knock-out pot with VOA vials. All VOA vials were iced and stored in a dedicated cooler until shipped to Energy Laboratories, Inc., in Rapid City, South Dakota.

Vapor samples were collected using disposable syringes and evacuated vials provided by Microseeps Inc., Pittsburgh, Pennsylvania. Once the samples were collected, they were stored at ambient conditions until shipped to the Microseeps laboratory for analysis.

Quality control samples were also collected in the field. Duplicate water and vapor samples were collected at a 10% frequency by the methods previously described. Trip blanks accompanied the VOA vials throughout shipping and handling.

2.2.2 Analytical Methodology

Groundwater samples were analyzed for VOCs by EPA Method SW-8260. Soil vapor samples were analyzed for VOCs by Microseeps Analytical Method AM 4.03.

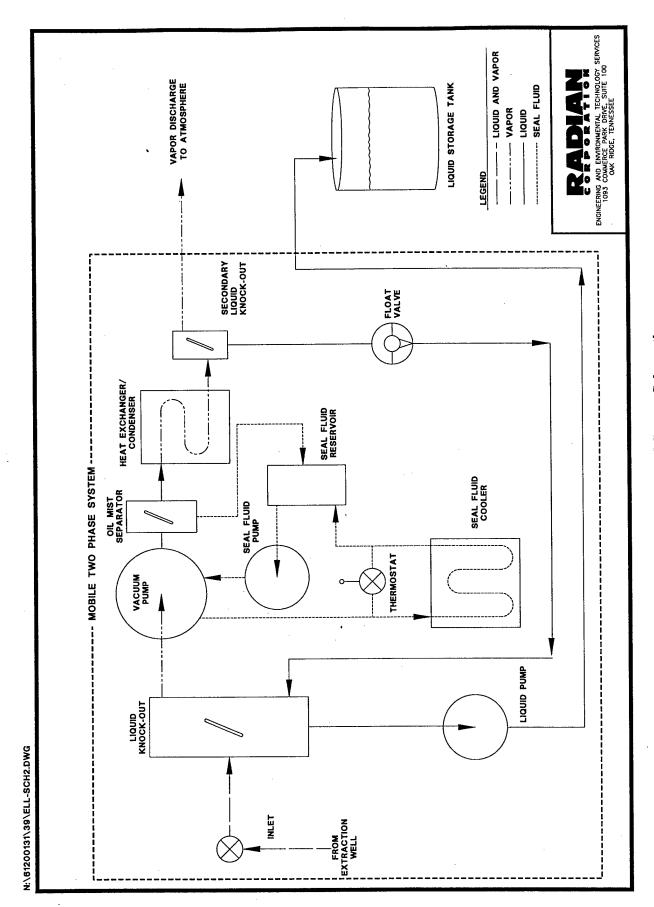


Figure 2-2. TPE System Schematic

Table 2-2

Frequency of Sample Collection and Source Monitoring

	<u>و</u>	J							<u>-</u>		1							T			Ī			
	Water Sample	from Knock-	Out Pot			X	×		×				×			X				X			×	×
			Parameters		X	X	X	×	×	X	X	X	X	X	X	×	X	×	×	X	X	×	X	×
	Effluent Induced Vacuum at	Soil Vapor	Monitoring Probes		X	X	X	X	X	X	X	X	X	X	×	×	X	X	×	×	X	X	X	X
	Effluent	Vapor	Samples						×							×				×			×	X
9	Water Levels	Groundwater	Piezometers	X	×	×	×	×	×	×	×	×	X	×	×	×	×	X	X	×	×	×	×	X
Schedule	Groundwater	Sample from	Test Well	X					-															×
	Moseuro	Water Level	at Test Well	×																				×
		Ambient	Temperature	×	×	×	×	×	×	×	×	×	×	×										×
	Ambiant	Barometric	Pressure	×				×		×			×	×										
			Hour	Before	1	. 2	4	0		2.5	3	3.5	4.0	0	0.5	2.0	3.0	3.5	4.0	5.0	0.9	7.0	8.0	3
			Day	0	*	-	-	7*	2	2	2	2	2	3**	3	3	3	3	3	3	3	6	3	4

Note: Groundwater/water samples analyzed for VOCs by Method SW-8260. Vapor samples analyzed for VOCs by Microseeps Analytical Method AM 4.03.

^{*}Unit was operated for only 4 hours on day one and then restarted and operated for only 4 hours on day two. **Unit was restarted on day three and operated for 21.5 hours.

3.0 TEST RESULTS AND CONCLUSIONS

A critical step toward adding another presumptive remedy to the PREECA process is to compare that remedial technology's test results, referred to here as the "site-specific profile," to its PREECA Multi Phase Extraction (MPE) remedy profile and determine the extent to which the two profiles match. The remedy profile comprises the performance data (including site selection criteria, process and methodology descriptions, and the acceptable range of quantitative results) by which the effectiveness of the presumptive remedy will be judged.

Radian performed a three-day test on the EW-1 well. Table 3-1 summarizes the results achieved using the TPE system at the EW-1 well. The results of this test are described in Section 3.4.

Table 3-1
Summary of Results

System Parameter	EW-1
Groundwater Extraction Rate	15 gpm
Soil Vapor Extraction Rate	0-2.5 scfm
Contaminant Removal Rate	0.04 lb/day
Radius of Influence (Groundwater)	>100 ft

gpm = gallons per minute scfm = standard cubic feet per minute

Based on the results of the pilot-scale TPE test conducted at Ellsworth AFB Pride Hangar, Radian has constructed a site-specific profile for the Pride Hangar. A comparison of this site-specific profile to the PREECA's MPE remedies profile are presented in Tables 3-2 and 3-3. Note that the Pride Hangar profile compares favorably with the corresponding MPE remedy profiles for the dual-phase extraction remedies. However, this site does not fit within the TPE remedy guideline. The high groundwater production rate does not match the TPE criterion. However, the lithology present may

indicate moderate permeability soil that may be suitable for LVDPE.

3.1 System Operation

Physical and analytical data were analyzed to determine the following:

- Baseline VOC concentrations in groundwater;
- The major VOC constituents in the vapor and water streams;
- Average groundwater and soil vapor extraction rates;
- Average VOC extraction rates and total pounds of VOCs removed;
- The relationship between time and VOC concentrations;
- The relationship between time and vapor and water flow rates; and
- The relationship between distance and groundwater drawdown and induced vacuum, including radii of influence.

3.2 Radii of Influence and Production Rates

The following sections describe groundwater and vapor production rates and radii of influence.

3.2.1 Groundwater

The groundwater flow rate was measured using a totalizing flow water meter and is plotted along with the total vapor flow rate on Figure 3-1. Water table drawdown was measured in piezometers P-1, P-2, and MW941103 (Appendix B). A plot of drawdown versus time is presented in Figure 3-2 and maximum drawdown versus distance for the EW-1 test is presented in Figure 3-3.

Table 3-2 MPE Technology Selection Criteria for the Pride Hangar Site

Criteria Parameter	Pride Hangar Site	Guideline - 4.50
Contaminant	TCE	Halogenated VOCs, and non-
		halogenated VOCs & TPH for sites
		where expedited action is required
Contamination location	saturated zone	Saturated zone alone or saturated &
1		vadose zones combined
Contaminant concentration	97-410 μg/L	Significantly greater than MCLs (the
		Ellsworth AFB MCL for TCE is 5.0
		μg/L)
Henry's Law Constant of majority of	0.297 at 20 C°	> 0.01 at 20 C° (dimensionless) ¹
contaminants		
Vapor pressure of majority of	58 mm Hg at 20 C°	> 1.0 mm Hg at 20 C°
contaminants		
Lithology of saturated zone	clayey-gravel and weathered	Sands to Clays
	Pierre Shale	
Depth of contamination in vadose	N/A	> 5 feet bgs (MPE not applicable < 5
zone (if targeted)		feet bgs)
Average air permeability of vadose	N/A	Low permeability (< 1 x 10 ⁻³) and
zone (if targeted)		moderate permeability (between 1 x
		10 ⁻³ darcy and 0.1 darcy) soils.

¹ Dimensionless Henry's Law Constant in the form: (concentration in gas phase) / (concentration in liquid phase)

Table 3-3 LVDPE, HVDPE, and TPE Technology Selection Criteria for the Pride Hangar Site

Criteria Parameter	Pride Hangar Site	LVDPE Guideline	HVDPE Guideline	TPE Guideline
Groundwater production rate ¹	15 gpm (under vacuum)	> 2 gpm ²	No limitations	< 5 gpm
Depth of targeted contamination	> 25 feet bgs	No limitations	No limitations	Up to 50 bgs ± (for groundwater production < 2 gpm) Up to 20-30 bgs (for groundwater production = 5 gpm)
Lithology of saturated zone	Clayey gravel	Sands to silty sands	Sandy silts to clays	Sandy silts to clays
Average air permeability of vadose zone (if targeted)	N/A – not targeted	Moderate permeability (greater than 1 x 10 ⁻³ darcy)	Low permeability (less than 1 x 10 ⁻² darcy)	Low permeability (less than 1 x 10 ⁻² darcy)

¹ For MPE, the aquifer must be able to be dewatered.
2 For flows < 2 gpm, pneumatic pumps may be used in place of submersible pumps

Figure 3.1 Liquid and Total Vapor Flow Rates (PRIDE HANGAR SITE)

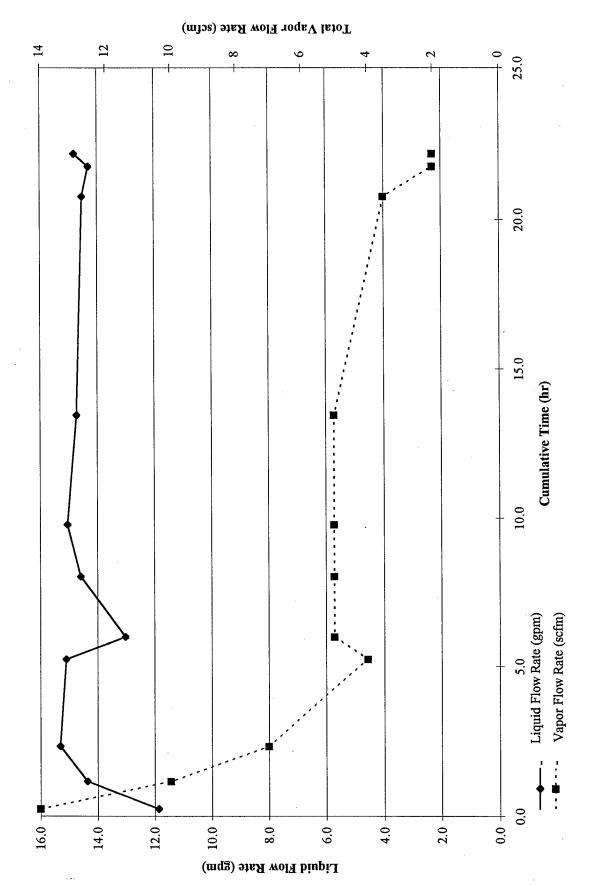


Figure 3.2 Water Level Drawdown Over Time (PRIDE HANGAR SITE)

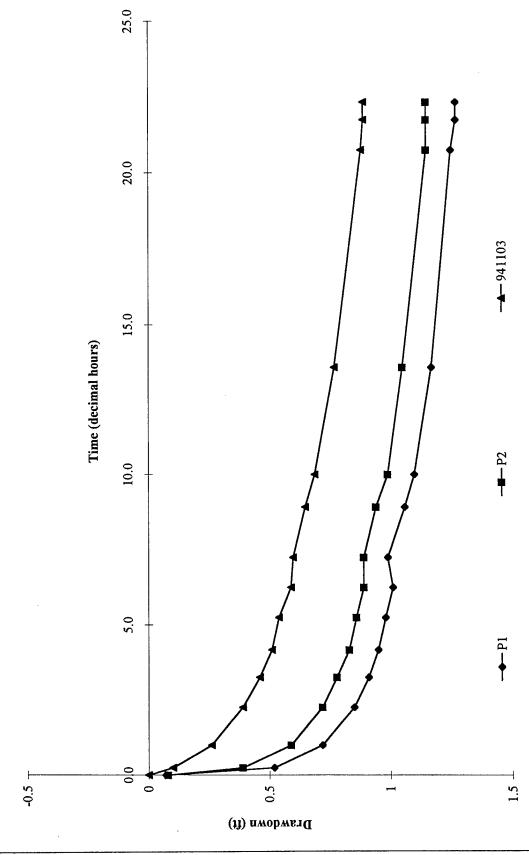
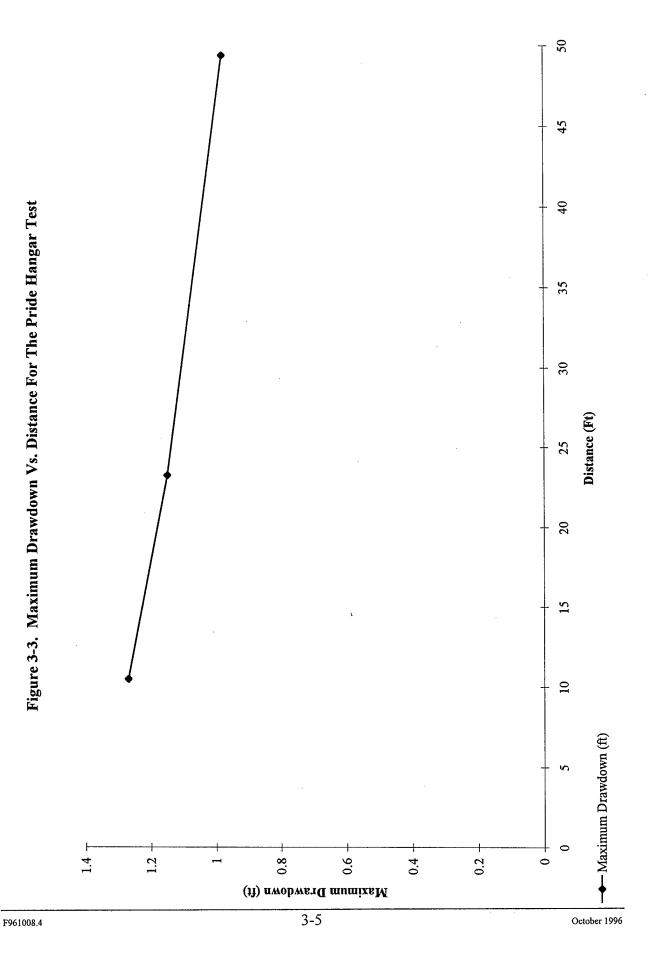


Figure 3-3. Maximum Drawdown Vs. Distance For The Pride Hangar Test



Because of water handling limitations, the TPE testing was of several short duration periods from 2 to 22 hours in length. During the longest test (22 hours), the groundwater flow rate fluctuated in the range of 14 to 16 gallons per minute (gpm) over most of the test period. Water levels in the piezometers dropped steadily over the length of the test and it is unlikely that steady state conditions were reached. The hydraulic radius of influence (defined as 0.1 feet of drawdown) is estimated to be 7100 feet based on available data. The short duration of the test, prevented an accurate estimate.

3.2.2 Vapor

The total vapor flow rate was measured using rotameters located at the skid and is plotted along with the water flow rate on Figure 3-1 for the Pride Hanger test. Induced vacuum was measured in piezometers P-1, P-2, and MW941103 and in vapor probes V-1, V-2, and V-3 (Appendix B). Figure 3-4 shows the maximum induced vacuum influence for the test.

3.3 VOC Recovery

Tables 3-4 and 3-5 summarize analytical results for the VOCs detected in the samples collected during the test. TCE was the primary contaminant found at the site (see Appendices C and D for the analytical laboratory results and chain-of-custody forms). Results of VOC sampling at EW-1 included:

- The baseline concentration (before the test) of chlorinated VOCs (TCE) in groundwater from EW-1 was 97 micrograms per liter (μg/L).
- The post-test concentration of chlorinated VOCs (TCE) was 410 μg/L. It is likely that a higher concentration area of the plume was pulled toward EW-1 as a result of the TPE.

- The chlorinated VOC (TCE) concentration in the extracted water (collected from knock-out pot) averaged 60 μg/L in the EW-1 test.
- The total VOC (TCE) concentration in extracted vapor increased throughout the EW-1 test, beginning at 0.5 ppmv and ending at 23.7 ppmv.

3.3.1 Extraction Results

Results of the Pride Hangar test included:

- Approximately 0.03 pounds of total VOCs were extracted from EW-1 in this short duration test. The majority of the compounds were extracted in the vapor phase.
- Average groundwater extraction rate was 15 gpm.
- Vapor extraction rate from the formation was 0-2.5 standard cubic feet per minute (scfm). Total system flow was 2-14 scfm.
- The TPE extraction system transferred approximately 80% of the VOCs in the groundwater to the vapor phase based on data near the end of the test, resulting in decreased concentrations in the water phase and reduced treatment cost.

3.3.2 VOC Removal Over Time

The graph showing total VOC removal over time at the test well is provided in Figure 3-5. Concentrations in extracted vapor increased during the test. Average off-gas vapor and effluent water concentrations for the EW-1 test were:

- 7.73 ppmv VOCs in extracted vapor and
- 60 µg/L VOCs in extracted groundwater.

Figure 3-4. Maximum Induced Vacuum For The Pride Hangar Test

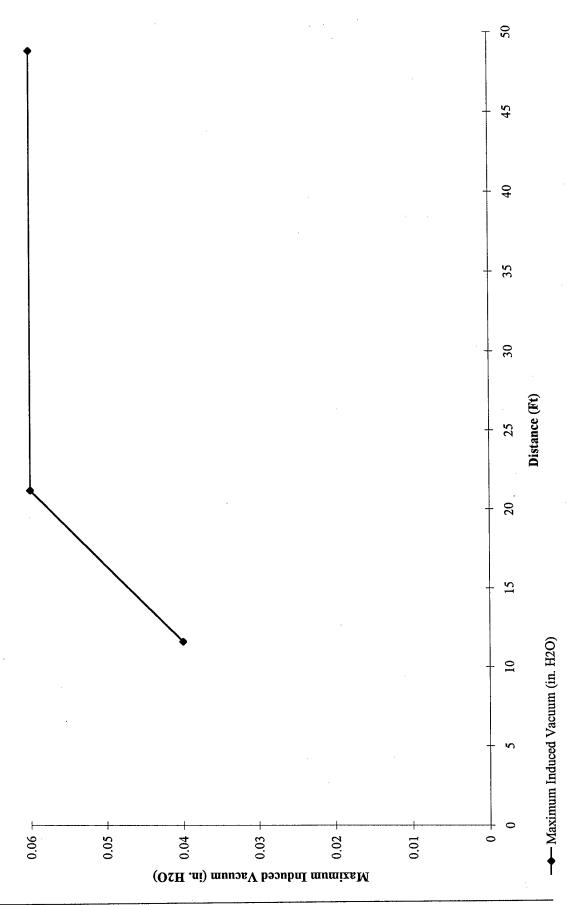


Table 3-4
Summary of Water Data
Concentration in Micrograms per Liter (μg/L)

		Contan	ninant ^a	
Sample ID	Chloroform	cis-1,2-Dichloroethylene	Trichloroethylene	Methyl Ethyl Ketone
EW-1 Pre-Test		-	97	
Effluent 1	2.6	1.4	77	
Effluent 2			37	
Effluent 3			56	
Effluent 4			34	
Effluent 5			78	
Effluent 6		1.4	78	
EW-1 Post-Test		3.3	410	50
EW-1 Post Test (Dup)		2.5	390	2.5

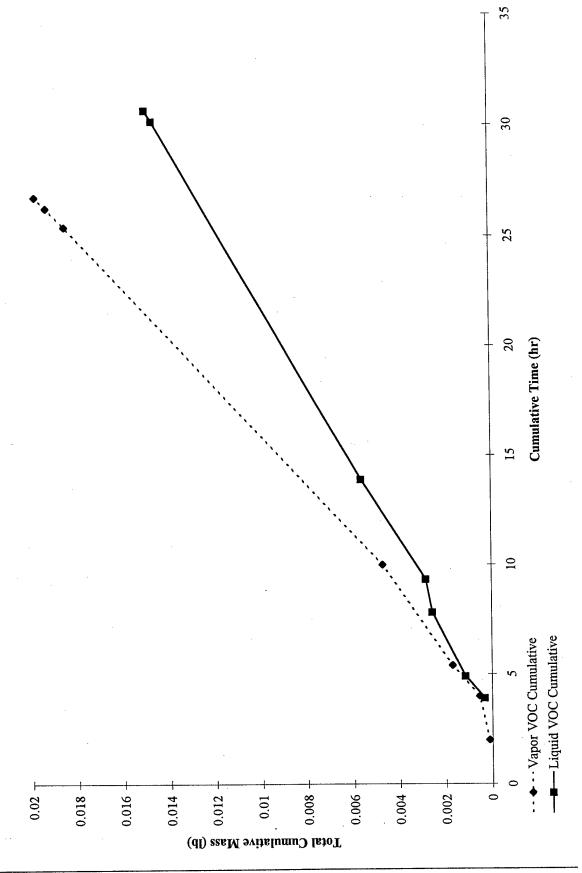
aOnly analytes with confirmed hits above detection limits are reported.

Note: All influent samples were taken from the knock-out pot prior to carbon treatment.

Table 3-5
Summary of Vapor Data
Concentrations in Parts per Million by Volume (ppmv)

		Extracted Va	por Concentration		
Sample ID	Toluene	Trichloroethylene	Tetrachloroethylene	1,1-Dichloroethane	Chloroform
V1	0.12	0.401	0.013	0.013	
V2	_	1.72			
V3		3.802			
V4	_	6.011			_
V5	_	11.09		0.12	0.005
V6	0.09	23.365	0.006	0.23	0.009
V6 (Duplicate)	0.08	22.170	0.005	0.23	0.009

Figure 3-5. Total Mass of VOCs Removed Over Time (water and vapor)



Fifty-four percent of the total VOCs removed were from the vapor phase and the remaining 46% were in the water phase.

3.4 Conclusions

3.4.1 Hydrogeologic Conclusions

An average flow rate of approximately 15 gpm at a drawdown of 10 feet at EW-1 was achieved during the TPE test. Well EW-1 has a 10-foot screen that was open within the saturated zone in the alluvial sediments and weathered fractured shale (see Figure 1-2). During the test, approximately 7 feet of the screen was exposed for vapor flow.

The saturated zone consists of a heterogeneous mixture of low permeability weathered and fractured shale (estimated hydraulic conductivity of 9.5 × 10⁻⁶ cm/s) (EA, 1995) and higher permeability clayey-sand and gravel. A slug test performed by Rust after the completion of the test indicated that the combined zone had a hydraulic conductivity of 1.4 × 10⁻² cm/s. Typical hydraulic conductivities for the saturated zone at Ellsworth AFB (as in EW-1, most wells tested were a combination of alluvial materials and weathered shale) range between 10⁻⁵ and 10⁻³ cm/s. EW-1 is clearly an outlier with a hydraulic conductivity of 10⁻² cm/s.

Because of water handling limitations, it is uncertain whether dewatering of the aquifer would have occurred over time and if well flow rates would as is typically seen at TPE sites.

Sustained yield is a function of the hydraulic conductivity, saturated thickness, recharge, and the variability of these properties around the pumping well. In some cases at Ellsworth AFB, well yields in similar higher conductivity materials were substantially lower than for EW-1. The more likely scenario is that higher conductivity materials are probably laterally more extensive in the Pride Hanger area.

3.4.2 Technology Evaluation

The TPE test on EW-1 at the Pride Hangar was conducted for 32 hours on 13-16 May 1996. Radian operated the extraction system for 4.5 hours on 13 May and four hours on 14 May to make appropriate adjustments to the equipment in order to operate continuously starting on 15 May 1996. Extracted groundwater was stored in large tanks on site and transported to the OU-1 treatment facility for final treatment. After 22.5 hours of continuous operation on 15-16 May, all available water storage capacity was full and the test had to be shut down.

Drawdown of approximately one ft was obtained at a radius of 50 feet in less than 24 hours. Because of the short duration of the test, ultimate radius of influence could not be determined, but the data suggested that it may be significantly greater than 100 feet.

Approximately 26,000 gallons of VOC (primarily TCE)-contaminated water were removed during the test operations between 13 May and 16 May 1996. Roughly 80% of the VOCs contained in the groundwater was stripped, based on data near the end of the test.

Whereas removal from the saturated zone was good, the conditions at this site would result in TPE being relatively ineffective at simultaneously removing volatile contaminants from the vadose zone (although significant vadose zone contamination was not present at this site). This site yielded a high water flow rate (15 gpm), because of the productive saturated zone. Yet it yielded a low vapor flow rate from the formation (0-2.5 scfm) because of the tighter vadose zone, and also because most of the vacuum energy was used to move the water. A higher vapor flow rate and higher formation vacuum would be needed to remove vadose zone contamination effectively.

This test was performed during a wet period and at a time when the seasonal water table is typically high. Even with operation over a longer time it is not known whether a larger area

would be dewatered such that water yield would decrease and dry out the sediments so that vapor flow would increase. In the 1995 Technical Evaluation Report for the OU-1 Two-Phase Extractors test, it was stated that TPE was applicable up to flows of 15 gpm. Because of this test, it was shown that TPE does not perform well at high flow rates with the present pilot test equipment configuration. Another configuration such as LVDPE or HVDPE may provide greater mass removal rates in highly productive formations.

4.0 ELLSWORTH AFB REMEDIAL ACTION ENHANCEMENT

The test at the Pride Hangar site revealed several important pieces of information:

- This is a productive aquifer compared with other locations on the Base that have been pumped.
- Groundwater was seasonally high and rising during the test. This likely resulted in a higher groundwater flow than would be obtained during a drier part of the year.
- Sampling conducted two years ago by EA indicated a concentration of 7,000 micrograms per liter (μg/L) TCE. Sampling following this test indicated only 410 μg/L. It is possible that the plume has migrated and/or dispersed significantly in this productive aquifer.
- Pre-test sampling on EW-1 indicated only 97 μg/L TCE, whereas post-test sampling indicated 410 μg/L, as stated above. This further suggests that the plume may have migrated and that the aggressive nature of the TPE process pulled the plume toward the well.
- Even though this was the area of highest concentration in the 1994 sampling, no vadose zone contamination was detected.
 This does not appear to be the source area for the plume.
- Although the TPE process would likely be effective if aggressive hydraulic control were desired, it is not likely the most cost effective technology for remediation of this plume.

It is recommended that another round of groundwater sampling of the existing well network be conducted in the area, particularly to the south and southeast of the Pride Hangar. This would show the extent of migration of this plume since the 1994 investigation. It was

suspected that a solvent tank at the northwest corner and/or a fuel oil tank on the south side of the Pride Hangar were sources of this plume and that it had migrated to the southeast corner in 1994. It may have continued to migrate since then.

Also, additional aquifer tests would give a better picture of the aquifer characteristics. This would be essential in the design of a groundwater control or remediation system in this area. This is particularly important since EW-1 appears to be one of the most productive wells on the Base.

It is likely that pump and treat would be the most cost-effective remedial technology at this site. Significant groundwater is expected from the fermution flow with conventional pumping, although it is likely to be less than the groundwater extraction rate expected with TPE. Considering the location of this plume in the middle of the Base, aggressive hydraulic control is probably not warranted. If the source area can be located with significant vadose zone contamination and/or DNAPL (dense, non-aqueous phase liquid), then a hot spot removal action with MPE may be appropriate.

5.0 REFERENCES

EA Engineering and Science, Inc., 1995.

Remedial Investigation Report, Operable Unit
11 at Ellsworth AFB, South Dakota, September.

Radian Corporation, 1996. Ellsworth AFB 2-PhaseTM Vacuum Extraction Pilot-Scale Test Work Plan, Ellsworth AFB, South Dakota, May.

U.S. Air Force, 1995. United States Air Force Presumptive Remedy Engineering Evaluation/ Cost Analysis (PREECA), Final, 5 May. APPENDIX A
Well Drilling and Development Logs

SINGLE COMPLETION WE		Well Number Pride Hargar EW-1
CONSTRUCTION LOG 5/	11/96	Well Hulliber Triote Harigar Coo)
Project Elbworth 2-Phase		Project Number 4/2-00 - 31-30
Location Pride Hangar		Datum
Top of Casing Elevation		Ground Surface Elevation
— M —		BORING
	A	A. Total Depth (ft) 35
	G G	B. Boring Diameter (in.)
	↓	Drilling Method
	1	WELL CONSTRUCTION
		C. Casing Length (ft)
		Type Sel. 40 PVC
		D. Casing Diameter (ft)
E	H	E. Depth to Top of Slotted Interval (ft) 23.5
-D-		F. Perforated Casing Length (ft)
		Perforated Interval From 23.5 to 33.5
		Perforation Type Continuous Wrap PW
19.7' 5	*	Perforation Size 0,010
c $\stackrel{\downarrow}{\sim}$	Å Æ I	G. Surface Grout Interval (ft) $O_{\frac{-19}{9}}$
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	A	H. Backfilled Interval (ft) NA
↓ -		Backfill Material NA
23,5		I. Sealed Interval (ft)
		Seal Material 3/8" Bentonite Pelets
		J. Filter Pack Interval (ft) 21-33.5
-140	J	Pack Material 10/20 Silica Sand
F = 10 ft		K. Bottom Seal Interval (ft) Botom Cap.
		Seal Material PVC
		Bottom cap 0.4' L. Depth to Top of Casing (in)
		M. Protective Casing Diameter (in) 12"
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	<u> </u>	Bentonite = 2 buckets Rellets Bento Chile 1 629
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	16	with white calc deposits Cobbles in top 0.3 Pt. The	HS=4.5pp			51 🐔	AA= 1 ppm BZ= 2 ppm	
	18-	clay	HS=25pg	82.				
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	Ġ	B. Boring Diameter (in.)
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		D. Casing Diameter (ft)
E	H	E. Depth to Top of Slotted Interval (ft) 20
D-D-		F. Perforated Casing Length (ft) 10-77
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		Seal Material Bentonite Pollets
		J. Filter Pack Interval (ft) 18-30 ft
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	11-	0-0.7 as above gravelly fine to ned clayey sand	SS		,	1.1	BZ= / ppm	
Sh	=	0.7 - 1.1 Fine to med. rand with gravel + cobbles bookly sorted dry loose	H2:0 pp)n			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	14-	poorly sorted, dry, loose strong bown 7.5 YR 5/6						
.60	15	0-0.6 as above	50			11.3	,	
SC	17-	6.6-1.2 fine to very coar clayey sord, poorly streed, dry tr ship, subrounded lack yellowish born 10 YR 41 1.2-3.7 Fat clay with whate sale deposits. damy 150ft lack grayish born 10 YR	1	· · · · · · · · · · · · · · · · · · ·	:	4.3	AA = 0, 4 PP	
CH	18-	1.2-37 Fat clay with white sale deposits. damy	HS=0.	9 ppm				
		3.7-4.3 fine clayey sand! well sorted, some Festaining 10 YR 5/4 yellowish brown	clay	allux			Stopped at	
SC	21-	0-1.8 Clayey fine sand well sorted, saturated, med. dense., Yellowth brown				1.8	5/11/96 7:30 am Rasmondi Arillias	
-	22-	Hed duse, Vellowth brown HOYR 5/4 Becomes cows Horn 1.4-1.8 with minor	r H3=1	24 ppm			Se 00 Shoppe	
•	24-	= gravel		・ 一般の			drilling sheet drive shall p	
	25- 26-	= 0.3 Weathered Pierre Sh Fe starring, crumbly, damp,	ale			3	Resumed drill at 10:45 a	
	27	Dark Blusch gray 2014 3/1	比多					
	28	PROJECT				HOLE NO.		

9

END BORING 11:15am

A-

SINGLE COMPLETION WELL	
CONSTRUCTION LOG 5/12/21/2	Well Number Pride Hargar D-2
Project Elsworth 2-Phase	
Location Pride Hangar	Datum
Top of Casing Elevation	Ground Surface Elevation
→ M →	Glound Surface Elevation
	BORING
10.45	A. Total Depth (ft)
G	B. Boring Diameter (in.)
	Drilling MethodHSA
	WELL CONSTRUCTION
	C. Casing Length (ft) 30
	Type Sch 40 PVC
	D. Casing Diameter (ft)
E= 0' H	E. Depth to Top of Slotted Interval (ft) 9
-D-	F. Perforated Casing Length (ft) 20
	Perforated Interval From 9 to 29
	Perforation Type Slotted screen
	Perforation Size 10 s/67
C	G. Surface Grout Interval (ft)
7.6'	Grout Material Dac of ah Tupe I/II Rofland Cen
	H. Backfilled Interval (ft)
	Backfill Material
	I. Sealed Interval (ft)
	Seal Material 3/8" Bentonte Pelleti
	J. Filter Pack Interval (ft) 7.6-30
$\mathbf{F} = 20'$ $\mathbf{Y} = 19.6$	Pack Material Colo. Silica Sand 10-
	K. Bottom Seal Interval (ft)
	Seal Material Bollom Cap 0,4' L. Depth to Top of Casing (in)
	M. Protective Casing Diameter (in)
<u> </u>	Sand: THE THE I
30 K	Bentonito: 1 bucket
B → A A A A A A A A A A A A A A A A A A	Den unite, i oncker

			DRI	LLING	LOG	Pri	de	Hana	300	HOLE N	a P-2	3	
1. COMPANY		Radian	<u> </u>	2. D	RILLING SUBCON	TRACTOR	Max	m)	SHEET 1		1	
1. PROJECT		- Pha	38		4.10	CATION .	ide	Hana	0.0	15 4	_ succis	†	
S. NAME OF	DRILLER	Brent	Thomas		6. W.	NUFACTURER'S (N OF DREEL	CHE .	75		1	
	IO TYPES OI IPUNG EQUE	FORTLUNG ~	334" ID } A	ugl 15	8. H	8. HOLE LOCATION Pride Hongar							
		6	22 OD		9. 50	RFACE ELEVATION	N		J			†	
			core sample HSA	7	10.	ATE STARTED C	5/11/	91.	11. DATE COMP	ETEO 5	111:196	1	
12. OVERBU	ROEM THICK	HEZZ			15. (EPTH, GROUNDWA	TER ENCO	NULLED	¢ '		11970	┥	
13. DEPTH (DRILLED INTO	o ROCK 4 ft	into weath	ired S	hale 16. 1	EPTH TO WATER	NO EN	SED TIME AFTER	DRILLING COMPL	ETED		1	
14. TOTAL D	DEPTH OF H	^{ale} 30 -	A			THER WATER LET	EL WEASU	REMEDITS (SPECI	m			4	
18. GEOTECI	BOCAL SAM	PLES	DISTURBED	UNC	XSTURGED	19. TOTAL N	UNIDER OF	CORE BOXES				1	
20. SAMPLES	S FOR CHEM	HCAL ANALYSIS *	voc	VETALS	01	HER (SPECIFY)	OTH	er (specify)	OTHER (SP	CIPY)	21. TOTAL CORE	1	
22. DEPOSIT	ION OF HOL	<u> </u>	MORPHIN	LICANO COMPANIA	-						RECOVERY		
Pic	ZOM	eter		Piez		HER (SPECIFY)	┑ 、	OUM	M. M	Mar 3	4]	
GRAPHIC LOG	DEPTH		DESCRIPTION OF MATERIALS	VICE	FICLD SCRCE		SAMPLE	SAMPLE	<i>: [1]. [1</i>	land	N	-	
4	5		6		RESULTS	OR CORE	BOX NO.	INTERVAL	RECOVERY 9		REMARKS:		
Aghalt	=	Asphal	H 4 gravel +	?11						Son	d 16:15	F	
GC	1-	Coars	e gravelly	sand							d 16:15	E	
	_	411	e gravelly with some of	lau	HS=1	2				B2	= 1 pm	E	
	2	poorl	ly sorted, mo	الجار الم	10-					44	- 0.4 ppm	F	
	3—		art subround								••	E	
	=	loose	, light red 10	DR 6/6									
	4-			-				<u> </u>				E	
	=	,]				
	5	0 20	carey.					<u> </u>	-			E	
SC	6—	0-3.8	ne andy	etay)	#5=2	2.)					•	E	
3		damp,	me dayen med dense, u , brown 104	yell - 111					5 A				
	7—	socred	Premu 101	R 413								E	
j		200					*					E	
	8	3.8-5	.0 as above,	DVI			••					E	
	_ =	win	gravel/cobbluish brown 101	is,	110	ina	ucers					E	
SC- GC	3—	7.5	- our mine N In	11314	HS = 1	Z	7						
	10 -										•	E	
		· [7	PROJECT				_		HOLE NO.			<u></u> .	

PROJECT		DRILLING					нас на. Р- 2	134
PROJECT	Ellsw	orth 2-Phase: Pride Hangar INSM	CTOR Karen	Maista	,		SHEET SHEETS 2	1
GRAPHIC LOG g	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREDING- RESULTS d	GEOTECH SAMPLE OR CORE BOX NO.	SAMPLE INTERVAL 1	RECOVERY	SEMMES.	
EC 201	12-	0-1 Grayelly dayey sand, Aborly sorted, with cobbles subang to subround sand, loose, wet brown 7.5 YR 4/3 1-1.3 as above, but	HS=1pp	7		1,3	AA =/Apm	
	14-	very dark boown 7.5 YR 2.5/3 0-0.2 % above	HS =0.4					
СН	17	0.2 - 3.7 Fat Clay with white calc notules, homogeneous damp to work soft, light olive brown 2.5 ½ 5/3		Approx "		5		
SC	20-	3.7-5 Sandy clay, homogen domp, soft, brown 7.5 YR 5/2 iron staining	axHS=0.	HPPTZ TEN	· · ·			
660	21—	0-2.0 Sandy clay/clayey Sund as above iron staining 2-3 Clayey sandy gravel Sund is fine to coarse subance to controved Gravel/collobe	ts =0.4 Hs =0.4	approx, on SS		_. س		
Shale	26	is substituted, loose, saturated yellowish brown 10 YR 5/16 0-1 clayed sanly gravel as above 1-1:4 Weathered Pierre Stale.	HS=0.4			1.4		
	27—	homogeneous, wiff, dark granish gray Gley 3/1				HOLE NO.		
	30	END OF BORING AT 18:00 30' Repth	A-10					



CALCULATION SHEET

INTERNATIONAL 1999		CALC. NO
SIGNATURE & Maister	DATE 5/12/96	_ CHECKED DATE
PROJECT 2-Phase Test	Ellsworth AFB	JOB NO 6/2-001-31-30
SUBJECT Pride Hangar V	1-1 Installation	SHEETOFSHEETS
10 " org	rective l'diam. Sol	1. 40 PVC
Cover	The contract of the contract o	
		Ground Surface
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diam = 16/2"		
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RADIAN INTERNATIONAL LLC

CALCULATION SHEET

NATURE & Maestas DATE 5/1	2/96	CHECKED	,	DATE	
			·	DATE	
DJECT 2-Phase Test Elisuier AFE	5			001-31-30)
BJECT Pride Hangar V-2		SHEET	1	OF	
SECT TO SE TO TO AT		SHEE!		UF	SHEE
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RADIAN

CALCULATION SHEET

					c	ALC. NO.		
SIGNATURE K. Maestrs	DA	TE 5/1	3/96	CHECKED	·	D	ATE	
PROJECT Pride Hangar 2-Pha					612-			
SUBJECT_ V-3 Installat	iàn							
12" Potective	1 1	recend Asphalt				e van en een valamerikse	n mangangan kalungan sejaka Kababbah s	anto solo mandalmente al el compose de la
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and the control of th		A-13	property were some con-	Principle for the section of the con-	t transfer about form the training of	er, videba nggi migi min	T SERVICE TO THE P. T. LEWIS CO.	an a paragraphy (graphy)

			CONTA	INEDITI	ED MAT	TERIALS LOG	Page	of
	Project	Ellsworth					, _	
		Rapid City	State	D		11.001	<i></i>	•
		7.	•		Max PID.	·		•
Depth:	Drum Number	Well or Boring Number	Matenal Type		Filed	Location Moved to	Pinal Disposition	Signatures of Movers
0-10"	Pride -01	EW-1	Soil	5/0/-0	673			
10-15'	Aide-02	€W-1	Soil	5/10/76				
	Pride-03	EW-1	501	5/10/96				
	Prido-OH	P-1	201	Sug. 35				
20,-301	Pride -05	P-1	.Zo:	=/11/9,	0.4			
withing fer award:	Pride-06	EW-1	Soul Vac	511.25				
0-30'	Prido-07	P-2	Sui :	5/11/29	2.1			
utilities for more	Prido-08	P-2	المراجع المحارية	5 2.0				
	Pr.do-09	V-1	501, - 100	5/12.5	, W.			
	Pride-10	V- 2	Soil Hines	3/12/38	AM		•	
0-17'	Prido-11	V-3	Soil Trea	5/13/916	AM			
	Pride-12	EW-1	itiate,	5/2/90	NA			
	Prich - 13	EW-1	uso tor	5/12/ ₉	AK			
	Pride-14	P-1	~ .	5/1/1/6				
	Paclo-15	P- 2	Parate,	** 13 to 3.	ИА			
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	+ 9 dn	ams of a	econ wo	ite				
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*PID reading is ppm. Headquit.

Recorded by: Karin Maleta

PROJECT Ells SUBJECT 2	worth A	FB					date <u>5</u> sheet <u>/</u>	12 96 OF SHEET
INSTALLATION ID IAI			i.	ID (LOCID	-		(LOGDATE)	(LOGTIME)
PERFORMED BY (LOG Radian	(CODE)		WATE	ER LEVEL (S	STATDEP) TOC	INAL	TOTAL DEPTH (SO INITIAL 32.97 below	FINAL
Bailer	łod		•		SURGET	ECHNIQ		
FIELD MEASUREMENT	TS .				***************************************			
Time (LOGTIME)	Cum: Volume (gal)	P	Water C	Disality Condi	Turb:	Water Level		DIRECTOR
16:00	Star	t Deve	-100	ment				
1645	30		.2	1800	· Jery Silty			
17:10	50		2	1800	very			* ***
17:45	70	56 7.	3	1700	S.H.			
j7:55	75	56 7.	3	1700	verity			
18 20	95	55 7.	2	1700	very t silty	19.4		
18:41	105	54 7.	2	1800	moderately oilty			
18:55	110	SAMP	LED	WE	LL	19.3	5	
								· · · · · · · · · · · · · · · · · · ·
	:						 	
Final Measurements:				·				
Total Volume Removed							Time	

Figure 3-8. Well Development Log

PROJECT SUBJECT	sworth A	FB						5/12/96 OF <u>}</u> SHEE
INSTALLATION ID IAI	HAFR		WEL		-		(LOGDATE)	(LOGTIME)
PERFORMED BY (LOG			INITI	TER LEVEL IS AL 27 below	1	INAL	TOTAL DEPTH (S	OUNDING) FINAL
Bailin					SURGE	LECHNIO	UE	
FIELD MEASUREMENT	rs							
Time	Cum: Volume	Temp	Same Car	Quality		Water		
(LOGTIME)	STA		EVEL	OPME	11.15	Level	Co	mments.
18:25	15	55	7.2	1800	very silty to muddy			
18:38	20 25	54	7.2.	1900	to midde			
19:00	<i>3</i> 3	53	7.2	1900	very sitty to muddy	19.30		
			 					
· · · · · · · · · · · · · · · · · · ·								·
							-	
			***************************************				_	
Final Measurements:							<u> </u>	
<u>· · · · · · · · · · · · · · · · · · · </u>						<u> </u>	Time	1
Total Volume Removed			•					

Figure 3-8. Well Development Log

SUBJECT Pri		ar					SHEET_	∠ OF <u></u> SHEE
INSTALLATION ID (A)	_		WELI	L ID (LOCID)			(LOGDATE)	(LOGTIME)
PERFORMED BY (LOG					\simeq			
Radio			INITI	ER LEVEL (S AL 1.30 belou	F		TOTAL DEPTH ((Sounding) Final
DEVELOPMENT METH					SURGE T	LECHNIO	UE	
bail	lers			-				
FIELD MEASUREMENT	rs							
			Water	Citality				
Time (LOGTIME)	Cum: Volume (gai)	Temp	pH	Cond	Turb.	Water Level		Offineres:
9:10	S77	RTD	EVEL	OPM	ENT	19.30		VIDENT CO.
9:25	10	54	7.2	1600	very sitty			
9:45	20	55	7.2	1500	Very			
9:55	22	56	7.2	1600	very			
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Figure 3-8. Well Development Log

APPENDIX B
Field Data Tables

1921 1921 Purpmeter Yacuum Paper Frabe Yacuum Purpmeter Yacu				4	ield Mes	omeaner	te Data	1,004					
Presenter Nacrum Paper Proble Vacuum Weather Figure Problem Weath	11111 20	Water Level	ie.	•			13 Data) alleet			_		
9 F.T. 941103 V.T. V.Z. V.S. (46g. b)	<u>ş</u>	* top of	casing)	Š.	Piezo	meter Vac	шш	Vapo	r Probe V	acuum	We	ather	· 1
0	+	941143	941104	941129	H	2	-	Į,		L	(dee F)	(4W	Chumbate
19.21 19.21	⊢	20.94											depth tot
1921 1921	. +	22.27 *			0	0		٥				90(6 pre test
19-21 19-2	21.2	22.46			0	0		٥					1-1/4" straw
19.21	_ -	22.54			0	0		0					
19.21	21.34	22.59			0	0						18	
19.21 19.21	+	77.07										3	2 increase straw to I-1/2"
0	20.83	22.27		19.21									prior to startup of test on 14th
10	21.35	22.51			0	0		0					2" straw
0	4	22.6			0	0	0	0			70		
0	21 63	27.47		1	1	(T					
0.04	\perp	22.57		T	0	5 0		0				708	
0.04	21.46	22.62			0	0		0				Ϋ́ I	wans 7
0.35	21.5	22.68			9.0	0		0					
0.15					0.35	0		0.01					
19.47 19.3 0.06 0.01 0.09 0.01 0.001 892 19.47 19.3 0.06 0.01 0.09 0.02 0.03 0.04 0.01 0.08 0.01 0.09 0.02 0.03 0.04 0.05 0.02 0.09 0.03 0.01 0.01 0.05 0.02 0.09 0.03 0.01 0.01 0.03 0.01 0.07 0.02 0.02 0.03 0.01 0.07 0.02 0.02 0.03 0.01 0.07 0.02 0.02 0.04 0.09 0.04 0.02 0.04 19.64 19.37 0.01 0.01 0.04 0.00 0.01 0.02 0.04 0.09 0.04 19.64 19.37 0.01 0.01 0.04 0.00 0.01 0.02 0.04 0.00 0.01 0.02 0.04 0.00 19.64 19.37 0.01 0.01 0.04 0.00 0.01 0.02 0.04 0.00 0.01 0.01 0.04 0.00 0.01 0.01 0.04 0.00 0.01 0.01 0.04 0.00 0.01 0.01 0.04 0.00 0.01 0.01 0.04 0.00 0.01 0.01 0.04 0.00 0.01 0.01 0.04 0.00 0.01 0.01 0.04 0.00 0.02 0.01 0.04 0.00 0.03 0.04 0.04 0.00 0.04 0.05 0.04 0.00 0.05 0.05 0.05 0.00 0.05 0.05 0.	21.55	22.74			0.15	0.02		0.02					prior to shutdown
0.16	20.93	22.36					T						1
0.16	21.24	22.46											apar and
19.47 19.3 0.01 0.08 0.01 0.01 0.01 892	╝				0.16	0	0.08	0.01	0				
19.47 19.3 0.06 0.01 0.09 0.02 0.02 0.02 0.02 0.02 0.03 0.04 0.04 0.05		22.62			0.08	0.01	0.08	0.01	0.01	0.01		892	
19.47 19.3 0.06 0.01 0.09 0.02 0.03 0.04	21.57	22.75			9. 20.	٥	0.1	0				905	
0.05 0.02 0.09 0.03 0.01 75 901 0.05 0.05 0.02 0.1 0.04 0.02 0.02 0.02 0.03 0.01 0.07 0.01 0.02 0.02 0.02 0.02 0.03 0.01 0.07 0.01 0.02 0.02 0.02 0.02 0.03 0.01 0.04 0.02 0.02 0.04 0.02 0.04 0.02 0.04 0.02 0.04 0.02 0.04	1	78.77	-	19.3	0.00	0.01	0.09	0.02					
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* Measured from top of piezometer stick-up

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2-PHASE System Operating Conditions Data Sheet

		Totalizer ir. Liquid		┡	0 start up		2642 start up		3146	4130	4397 start up	4912	6162 shutdown for night	6162 pre-test start up	6340	7130 20-deg aspir. air valve	8202	10844	11430	shutdown at 16:02 for 13 minutes	13210	14790 thunderstorm	18030 cutback aspiration, asp=3.5; total=4	22422	25280	25650	25737 total flow for tests
		Aspir.		1-	L	0		9	9	7		5	7		14	6	5.6	3	2.5		4	4	4.5	3.5	2	2	
	apor		re Flow (scfm)	Г		-		9	9	7		5	7		14	10	7	4	5		5	5	5	3.5	2	2	
	Exhaust Vapor		Pressure (psi)					_	_	L		-	1		1	1	1	1	1		1	1	1	1	-	-	
	E		Temp.			100		130	138	120		70	70		72	11	42	78	92		78	92	62	28	28	09	
		Oil Pot	Pressure (psi)			17		16	16	16		17	17		19	17	17	16	16		15	16.5	18	18	18	18	
0	Seal Fluid	Oil Pot	Temp. (deg F)			180		180	180	180		180	178		180	180	180	180	180		180	180	178	178	178	178	
	Seal	Pressure at	Pump (psi)			Ī		1	1	1		1	1		1	1	1	1	1		1	1.5	2	1	1	I	
			Temp.			178		180	180	178		175	175		174	176	176	176	176		176	176	176	176	176	176	
	Wellhead	Well	Vacuum (in. Hg)			0		1	1	2		2.5	2.5		0	2	3	3.5	3.5		3.5	3.5	3.5	4	3.5	3.5	
	Well	Top of Straw	Vacuum (in, Hg)						•	ı		•				•	•	٠	•		•	•	•		,	•	
	System Inlet		Vacuum (in. Hg)			28.0		29.0	29.0	29.0		27.5	did not read		26.5	27.0	28.0	28.0	28.0		29.0	27.5	26.0	26.0	26.5	26.5	
	Syst		Temp. (deg F)			43		40	40	41	9	40	40		40	40	40	40	40		40	40	40	40	40	40	
		Total	Operating Hours	2651.4	2651.9	2653	2656.8	2657	2658	2658.6	2659.1	2659.8	2661	2661.3	2661.6	2662.4	2663.7	2666.6	2667.3		2669.6	2671.4	2675.1	2682.6	2683.6	2684	End of test
			Time		13:05	14:17	14:40	15:00	16:00	16:35	18:05	18:40	20:05	8:45	9:00	9:55	11:05	14:00	14:45	16:02	17:00	18:45	22:25	5:45	6:45	7:10	7:30
			Date	5/17/96	2/13/96	2/13/96	5/14/96	5/14/96	5/14/96	5/14/96	5/14/96	5/14/96	5/14/96	2/15/96	2/15/96	5/15/96	2/15/96	2/15/96	5/15/96	5/15/96	2/15/96	2/15/96	2/15/96	2/16/96	5/16/96	2/16/96	2/16/96

* started unit on 5/12/96 to test system

Date Extracted Liquid Vapor Liquid Duplicate Blank Duplicate Groundwater 5/12/96 19:00 SW-82608015M AM4.02 SW-8260/8015M SW-8260/8015B SW-8260/8015B 5/12/96 19:00 Pride discharge - 2 Pride V-1 X EW-1 Pre Test 5/14/96 16:00 Pride discharge - 3 Pride V-2 EW-1 Pre Test 5/14/96 19:00 Pride discharge - 4 Pride V-2 EW-1 Pre Test 5/14/96 10:10 Pride discharge - 5 Pride V-3 EW-1 Pre Test 5/15/96 10:10 Pride discharge - 5 Pride V-4 X EW-1 Post Test 5/16/96 6:10 Pride discharge - 5 Pride V-6 X EW-1 Post Test 5/16/96 7:00 Pride discharge - 6 Pride V-6 X EW-1 Post Test 5/16/96 7:00 Pride discharge - 6 EW-1D Post Test X EW-1 Post Test		Ellswoi	sworth Air Force Base - Two (2) Phase Pilot Test (Pride Hangar) Analytical Sampling Field Data Sheet	Base - Ty llytical San	ce Base - Two (2) Phase Pilot Te Analytical Sampling Field Data Sheet	ilot Test (a Sheet	Pride Ha	ingar)
Time SW-8260/8015M AM4.02 SW-8260/8015M AM4.02 AM4.02			Extracted Liquid	Extracted Vapor	Liquid Dublicate	Liquid Trip Blank	Vapor Duplicate	Groundwater
19:00 X 15:40 Pride discharge - 1 X 16:00 Pride discharge - 2 Pride V-2 20:00 Pride discharge - 3 X 10:10 Pride discharge - 4 Pride V-3 6:10 Pride V-6 X 7:00 Pride discharge - 6 Pride V-6 7:00 Pride discharge - 6 Pride V-6 7:00 Pride V-6D X	Date	Time	SW-8260/8015M	AM4.02	SW-8260/8015M	SW-8260	AM4.02	SW-8260/8015M
15:40 Pride discharge - 1 X 16:00 Pride discharge - 2 Pride V-1 19:00 Pride discharge - 3 Co.00 20:00 Pride discharge - 4 Pride V-3 10:10 Pride discharge - 5 Pride V-4 6:10 Pride V-6 X 7:00 Pride discharge - 6 Pride V-6 7:00 Pride discharge - 6 Pride V-6 7:00 Pride V-6D X	5/12/96	19:00				X		EW-1 Pre Test
16:00 Pride discharge - 2 Pride V-1 19:00 Pride discharge - 3 - 20:00 Pride discharge - 4 Pride V-3 10:10 Pride discharge - 5 Pride V-4 6:10 Pride V-5 X 7:00 Pride V-6 X 7:00 Pride V-6 X 7:00 Pride V-6D X 9:45 EW-ID Post Test X	5/13/96	15:40	Pride discharge - 1			X		
19:00 Pride discharge - 3	5/14/96	16:00	Pride discharge - 2	Pride V-1				
20:00 Pride discharge - 3 - A -	5/14/96			Pride V-2				
10:10 Pride discharge - 4 Pride V-3 X 14:45 Pride discharge - 5 Pride V-4 X 6:10 Pride V-5 C 7:00 Pride discharge - 6 Pride V-6D X 7:00 Pride V-6D X 9:45 EW-ID Post Test X	5/14/96	20:00	Pride discharge - 3					
14:45 Pride discharge - 5 Pride V-4 X 6:10 Pride V-5 Pride V-6 7:00 Pride discharge - 6 Pride V-6D X 7:00 Pride V-6D X 9:45 EW-ID Post Test X	5/15/96		Pride discharge - 4	Pride V-3				
6:10 Pride V-5 Pride V-6 7:00 Pride V-6D X 9:45 EW-ID Post Test X	5/15/96		Pride discharge - 5			X		
7:00 Pride discharge - 6 Pride V-6D X 7:00 Pride V-6D X 9:45 EW-ID Post Test X	5/16/96	6:10		Pride V-5				
7:00 Pride V-6D X 9:45 EW-ID Post Test X	5/16/96	7:00	Pride discharge - 6	Pride V-6				
9:45 EW-ID Post Test X	5/16/96	7:00		Pride V-6D			X	
	5/16/96	9:45			EW-ID Post Test	X		EW-I Post Test

APPENDIX C

Groundwater Sample Analytical Data



ENERGY LABORATORIES, INC.

P.O. BOX 2470 • RAPID CITY, SD 57709 • PHONE (605) 342-1225 610 FARNWOOD STREET • RAPID CITY, SD 57701 • FAX (605) 342-1397

Radian Corporation P.O. Box 201088 Austin, TX 78720-1088 Ellsworth AFB, Pride Hanger

Sampled: 05-12-96

May 14, 1996 96-23291

Submitted: 05-13-96

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Site	Depth	Lab No.	Methodology	Analysis	Results	Units	Analyzed
L							···

EW-1 Pretest	96-23291	EPA 8015 Mod.	TPH as Gasoline	43*	μg/L ppb	DM:05-13-96
		8260 LONG	•			RH:05-13-
				<i>µ</i> g/L	PQL	MH:05-13-5
			1,1-Dichloroethene	<1.0	1.0	
			Methylene Chloride	<1.0	1.0	
			trans-1,2-Dichloroethene	<1.0	1.0	
			1,1-Dichloroethane	<1.0	1.0	
			2,2-Dichloropropane	<1.0	1.0	
			cis-1,2-Dichloroethene	1.6	1.0	
	•		Bromochloromethane	<1.0	1.0	
			Chloroform	<1.0	1.0	
			1,1,1-Trichloroethane	<1.0	1.0	
			Carbon Tetrachloride	<1.0	1.0	
			1,1-Dichloropropene	<1.0	1.0	
			Benzene	<1.0	1.0	
			1,2-Dichloroethane	<1.0	1.0	
			Trichloroethene	97	(1) 1.0	
			1,2-Dichloropropane	<1.0	1.0	
			Dibromomethane	<1.0	1.0	
			Bromodichloromethane	<1.0	1.0	
			Trans-1,3-Dichloropropene	<1.0	1.0	•
			Toluene	<1.0	1.0	
			cis-1,3-Dichloropropene	<1.0	1.0	
			1,1,2-Trichloroethane	<1.0	1.0	
			Tetrachloroethene	<1.0	1.0 .	
			1,3-Dichloropropane	<1.0	1.0	
			Dibromochloromethane	<1.0	1.0	
			1,2-Dibromoethane	<1.0	1.0	
			Chlorobenzene	<1.0	1.0	
			1,1,1,2-Tetrachloroethane	<1.0	1.0	
			Ethylbenzene	<1.0	1.0	
		•	M+P Xylenes	<1.0	1.0	
			O-Xylene	<1.0	1.0	
			Styrene	<1.0	1.0	
			Bromoform	<1.0	1.0	
			Isopropylbenzene	<1.0	1.0	
			Bromobenzene	<1.0	1.0	
			1,1,2,2-Tetrachioroethane	<1.0	1.0	
			1,2,3-Trichloropropane	<1.0	1.0	
			n-Propylbenzene	<1.0	1.0	
	•		2-Chlorotoluene	<1.0	1.0	
			4-Chlorotoluene	<1.0	1.0	
			1,3,5-Trimethylbenzene	<1.0	1.0	
			tert-Butylbenzene	<1.0	1.0	
			1,2,4-Trimethylbenzene	<1.0	1.0	
			sec-Butylbenzene	<1.0	1.0	
			1,3-Dichlorobenzene	<1.0	1.0	
			1,4-Dichlorobenzene	<1.0	1.0	

<1.0

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1.0

p-isopropyttoluene

n-Butylbenzene

1,2-Dichlorobenzene

1,2-Dibromo-3-Chloropropane

Page 2 of 5

Site	Depth	Lab No.	Methodology	Analysis	Results	Units	Analyzed
EW-1 Pretest		96-23291	8260 LONG				RH:05-13-9
					<i>₽</i> ₽/L	<u>PQL</u>	
				1,2,4-Trichlorobenzene	<1.0	1.0	
				Naphthalene	<1.0	1.0	
				Hexachlorobutadiene	<1.0	1.0	
				1,2,3-Trichlorobenzene	<1.0	1.0	
				Acetone	<20	20	
				Methyl Ethyl Ketone	<10	10	
				'Dichlorodifluoromethane	<1.0	1.0	
				Chioromethane	<1.0	1.0	
				Viny! Chloride	<1.0	1.0	
				Bromomethane	<1.0	1.0	
				Chloroethane	<1.0	1.0	
				Trichlorofluoromethane	<1.0	1.0	
				2-Chloroethylvinylether	<1.0	1.0	
				Carbon Disutfide	<1.0	1.0	
				Vinyl Acetate	<1.0	1.0	
				Methyl Isobutyl Ketone	<10	10	
				2-Hexanone	<10	10	
				Acrolein	<10	10	
				Acrylonitrile	<10	10	
				Methyltertiary Butyl Ether	<1.0	1.0	
				lodomethane	<1.0	1.0	
		:	Surrogate Recoveries				
				1,2-Dichloroethane-d4	118	%	Recovery
				Toluene-d8	111		
				4-Bromofluorobenzene	101		

⁽¹⁾⁻Value derived from a 10x dilution.

Kurt R Slentz

Laboratory Manager

TPH value derived from a single peak on the chromatogram. The elution time is consistent with trichloroethene.

QUALITY ASSURANCE DATA

Method Blank	8260 LONG		<u>μα/L</u>	<u>PQL</u>	RH:05-13-96
		1,1-Dichloroethene	<1.0	1.0	
		Methylene Chloride	<1.0	1.0	
		trans-1,2-Dichloroethene 1,1-Dichloroethane	<1.0 <1.0	1.0	
		2,2-Dichloropropane	<1.0	1.0 1.0	
		cis-1,2-Dichloroethene	<1.0	1.0	
		Bromochloromethane	<1.0	1.0	
		Chloroform	<1.0	1.0	
		1,1,1-Trichloroethane	<1.0	1.0	
		Carbon Tetrachloride	<1.0	1.0	
		1,1-Dichloropropene Benzene	<1.0	1.0	
		1,2-Dichloroethane	<1.0 <1.0	1.0 1.0	
		Trichloroethene	<1.0	1.0	
		1,2-Dichloropropane	<1.0	1.0	
		Dibromomethane	<1.0	1.0	
		Bromodichloromethane	<1.0	1.0	
		Trans-1,3-Dichloropropene	<1.0	1.0	
		Toluene	<1.0	1.0	
		cis-1,3-Dichloropropene	<1.0	1.0	
		1,1,2-Trichloroethane Tetrachloroethene	<1.0	1.0	
		1,3-Dichloropropane	<1.0 <1.0	1.0 1.0	
		Dibromochloromethane	<1.0	1.0	
		1,2-Dibromoethane	<1.0	1.0	
		Chlorobenzene	<1.0	1.0	
		1,1,1,2-Tetrachloroethane	<1.0	1.0	
		Ethylbenzene	<1.0	1.0	
		M+P Xylenes	<1.0	1.0	
		O-Xylene	<1.0	1.0	
		Styrene Bromoform	<1.0	1.0	
		Isopropylbenzene	<1.0 <1.0	1.0 1.0	
		Bromobenzene	<1.0	1.0	
•		1,1,2,2-Tetrachloroethane	<1.0	1.0	
		1,2,3-Trichloropropane	<1.0	1.0	
		n-Propylbenzene	<1.0	1.0	
		2-Chlorotoluene	<1.0	1.0	
		4-Chlorotoluene 1,3,5-Trimethylbenzene	<1.0	1.0	
	•	tert-Butylbenzene	<1.0 <1.0	1.0 1.0	
		1,2,4-Trimethylbenzene	<1.0	1.0	
		sec-Butylbenzene	<1.0	1.0	
		1,3-Dichlorobenzene	<1.0	1.0	
		1,4-Dichlorobenzene	<1.0	1.0	
		p-Isopropyltoluene	<1.0	1.0	
		1,2-Dichlorobenzene n-Butylbenzene	<1.0	1.0	
		1,2-Dibromo-3-Chloropropane	<1.0 <1.0	1.0 1.0	
		1,2,4-Trichlorobenzene	<1.0	1.0	
		Naphthalene	<1.0	1.0	
		Hexachlorobutadiene	<1.0	1.0	
		1,2,3-Trichlorobenzene	<1.0	1.0	
		Acetone	<20	20	
		Methyl Ethyl Ketone Dichlorodifluoromethane	<10 <1.0	10 1.0	
		Chloromethane	<1.0	1.0	
		Vinyl Chloride	<1.0	1.0	
		Bromomethane	<1.0	1.0	
		Chloroethane	<1.0	1.0	
		Trichlorofluoromethane	<1.0	1.0	
		2-Chloroethylvinylether	<1.0	1.0	
		Carbon Disulfide Vinyl Acetate	<1.0	1.0	
		Methyl Isobutyl Ketone	<1.0 <10	1.0 10	
		2-Hexanone	<10	10	
		Acrolein	<10	10	
		Acrylonitrile	< 10	10	
		Methyltertiary Butyl Ether	<1.0	1.0	
	Company Basses	lodomethane	<1.0	1.0	
	Surrogate Recoveries	1,2-Dichloroethane-d4	101	6/ □	01/00/
		Toluene-d8	111	% Rec	overy
		4-Bromofiuorobenzene	106		

QUALITY ASSURANCE DATA

	QUALITY	ASSURANCE DATA			
Trip Blank	8260 LONG		_		RH:05-13-96
		4 4 Dishlassahana	<u>νg/L</u>	POL	
		1,1-Dichloroethene Methylene Chloride	<1.0 <1.0	1.0 1.0	
		trans-1,2-Dichloroethene	<1.0	1.0	
	•	1,1-Dichloroethane	<1.0	1.0	
		2,2-Dichloropropane	<1.0	1.0	
		cis-1,2-Dichloroethene	<1.0	1.0	
		Bromochloromethane Chloroform	<1.0 <1.0	1.0 1.0	
		Chloroform 1,1,1-Trichloroethane	<1.0	1.0	
		Carbon Tetrachloride	<1.0	1.0	
		1,1-Dichloropropene	<1.0	1.0	
		Benzene	<1.0	1.0	
		1,2-Dichloroethane	<1.0	1.0	
		Trichloroethene	<1.0	1.0	
		1,2-Dichloropropane Dibromomethane	<1.0 <1.0	1.0 1.0	
		Bromodichloromethane	<1.0	1.0	
		Trans-1,3-Dichloropropene	<1.0	1.0	
		Toluene	<1.0	1.0	
		cis-1,3-Dichloropropene	< 1.0	1.0	
•		1,1,2-Trichloroethane	<1.0	1.0	
		Tetrachloroethene	<1.0	1.0	
		1,3-Dichloropropane Dibromochloromethane	<1.0 <1.0	1.0 1.0	
		1.2-Dibromoethane	<1.0	1.0	
		Chlorobenzene	<1.0	1.0	
		1,1,1,2-Tetrachloroethane	< 1.0	1.0	
		Ethylbenzene	<1.0	1.0	
		M + P Xylenes	<1.0	1.0	
		O-Xylene	<1.0	1.0	
		Styrene Bromoform	<1.0 <1.0	1.0 1.0	
		Isopropylbenzene	<1.0	1.0	
		Bromobenzene	<1.0	1.0	
		1,1,2,2-Tetrachioroethane	<1.0	1.0	
		1,2,3-Trichloropropane	<1.0	1.0	
	•	n-Propylbenzene	<1.0	1.0	
		2-Chlorotoluene 4-Chlorotoluene	<1.0 <1.0	1.0 1.0	
		1,3,5-Trimethylbenzene	<1.0	1.0	
		tert-Butylbenzene	<1.0	1.0	
		1,2,4-Trimethylbenzene	< 1.0	1.0	•
		sec-Butylbenzene	< 1.0	1.0	
		1,3-Dichlorobenzene	<1.0	1.0	
		1,4-Dichlorobenzene p-Isopropyltoluene	<1.0 <1.0	1.0 1.0	
		1,2-Dichlorobenzene	<1.0	1.0	
		n-Butylbenzene	<1.0	1.0	
		1,2-Dibromo-3-Chloropropane	<1.0	1.0	
		1,2,4-Trichtorobenzene	<1.0	1.0	
		Naphthalene	<1.0	1.0	
		Hexachlorobutadiene 1,2,3-Trichlorobenzene	<1.0 <1.0	1.0 1.0	
		Acetone	<20	20	
		Methyl Ethyl Ketone	<10	10	
		Dichlorodifluoromethane	< 1.0	1.0	
		Chloromethane	<1.0	1.0	
		Vinyl Chloride	< 1.0	1.0	
		Bromomethane Chloroethane	<1.0 <1.0	1.0 1.0	
		Trichlorofluoromethane	<1.0	1.0	
		2-Chloroethylvinylether	<1.0	1.0	
		Carbon Disulfide	<1.0	1.0	
		Vinyl Acetate	<1.0	1.0	
		Methyl Isobutyl Ketone	<10	10	
		2-Hexanona	<10 <10	10 10	
		Acrolein Acrylonitrile	<10	10	
		Methyltertiary Butyl Ether	<1.0	1.0	
		Iodomethane	<1.0	1.0	
·	Surrogate Recoveries				
		1,2-Dichloroethane-d4	115		% Recovery
		Toluene-d8 4-Bromofluorobenzene	105 101		
		, 5.5555			

Page 5 of 5

ENERGY LABORATORIES, INC. RAPID CITY, SD

TPH AS GASOLINE & MBTEX PID SURROGATE RECOVERY

	PID SURROGA	TE RECOVERY
LAB NUMBER		4-BROMOFLUORO-
	TRIFLUOROTOLUENE	BENZENE
96 23291	85	83
		·
, , , , , , , , , , , , , , , , , , , ,		·
	1	

CERTIFIED KNOWN DATA

Compound	Known	Lot#	True Value	Conc.	% Recovery	TFT % Rec	BFB % Rec	QC Limits
GAS	ERA	40002	510 ug/L	392 ug/L	77	121	100	60-140%

·		· · · · · ·		 γ	
PLEASE PRINT OR TYPE ALL INFORMATION EXCEPT SIGNATURES	Comments, Special Instructions, etc.	Include ais-1,1-DOE		Received by (signature):	Received for laboratory by (signatura):
PLEA		13	7	Time	Time 8:2(
=				Date	5/13/96 8:2(
CHAIN OF CUSTODY RECORD	An Water Soils/soi	>	2	. Refinquished (signature)	Relinquished (signature)
\overline{CC}	number of containers Sample Type: A W S V U O	7	8	<u> </u>	4.
	tan jav			Received by: (signature)	Received by: (signature)
e 605-342-1225 605-342-1397	Sampler's signature	test.	0 Ks	19/0	Тітв
ING. I Street voice fax	A A B Sa Sa	EW-1 Prefest	Blanks	Date Time	Date
ENERGY LABORATORIES, INC. P.O. Box 2470 610 Fammood Street Rapid City, SD 57709	P.O. # Project Name Address Contact Name & Phone, Thurst Name & Phone, Sampher's signature Invoice to: DATE Fride Hange Sampher's signature Machine Report to:	5/12/96 R:55 EW-	الدال المالية المالية	Relinquisped (signature)	Relinquished (signature)



ENERGY LABORATORIES, INC.
P.O. BOX 2470 • RAPID CITY, SD 57709 • PHONE (605) 342-1225
610 FARNWOOD STREET • RAPID CITY, SD 57701 • FAX (605) 342-1397

James Machin Radian International P.O. Box 201088 Austin, TX 78720-1088

Ellsworth AFB, Pride Hangar

May 15, 1996 96-23296

Sampled: 05-13-96

Submitted: 05-14-96

PΩI

Site	Depth	Lab No.	Methodology	Analysis	Results	Units	Analyzed

Water Analysis

Pride Hangar Site Discharge #1

96-23296 8260 LONG

RH:05-14-96

	<u>μα/</u> L	<u>PQL</u>
1,1-Dichloroethene	<1.0	1.0
Methylene Chloride	<1.0	1.0
trans-1,2-Dichloroethene	<1.0	1.0
1,1-Dichloroethane	<1.0	1.0
2,2-Dichloropropane	<1.0	1.0
cis-1,2-Dichloroethene	1.4	1.0
Bromochloromethane	<1.0	1.0
Chloroform	2.6	1.0
1,1,1-Trichloroethane	<1.0	1.0
Carbon Tetrachloride	<1.0	1.0
1,1-Dichloropropene	<1.0	1.0
Benzene	<1.0	1.0
1.2-Dichloroethane	<1.0	1.0
Trichloroethene	77 (1) 1.0
1,2-Dichloropropane	<1.0	1.0
Dibromomethane	<1.0	1.0
Bromodichloromethane	<1.0	1.0
Trans-1,3-Dichloropropene	<1.0	1.0
Toluene	<1.0	1.0
cis-1,3-Dichloropropene	<1.0	1.0
1.1.2-Trichloroethane	<1.0	1.0
Tetrachloroethene	<1.0	1.0
1,3-Dichloropropane	<1.0	1.0
Dibromochloromethane	<1.0	1.0
1,2-Dibromoethane	<1.0	1.0
Chlorobenzene	<1.0	1.0
1,1,1,2-Tetrachloroethane	<1.0	1.0
Ethylbenzene	<1.0	1.0
M+P Xylenes	<1.0	1.0
O-Xylene	<1.0	1.0
Styrene	<1.0	1.0
Bromoform	<1.0	1.0
Isopropylbenzene	<1.0	1.0
Bromobenzene	<1.0	1.0
1.1.2.2-Tetrachloroethane	<1.0	1.0
• • •	<1.0	1.0
1,2,3-Trichloropropane	<1.0	1.0
n-Propylbenzene 2-Chlorotoluene	<1.0	1.0
	<1.0	1.0
4-Chlorotoluene	<1.0 <1.0	1.0
1,3,5-Trimethylbenzene	<1.0 <1.0	1.0
tert-Butylbenzene		
1,2,4-Trimethylbenzene	,<1.0	1.0
sec-Butylbenzene	<1.0	1.0
1,3-Dichlorobenzene	<1.0	1.0
1,4-Dichlorobenzene	<1.0	1.0
p-Isopropyltoluene	<1.0	1.0
1,2-Dichlorobenzene	<1.0	1.0
n-Butylbenzene	<1.0	1.0
1,2-Dibromo-3-Chloropropane	<1.0	1.0
1,2,4-Trichlorobenzene	<1.0	1.0
Naphthalene	<1.0	1.0

Page 2 of 4

Site	Depth	Lab No.	Methodology	Analysis	Results	Units	Analyzed
					•		
	ar Site cont.						
ischarge	#1	96-23296	8260 LONG				RH:05-14-9
					<u>ν</u> α/L	PQL	
				Hexachlorobutadiene	<1.0	1.0	
				1,2,3-Trichlorobenzene	<1.0	1.0	
				Acetone	< 20	20	
				Methyl Ethyl Ketone	<10	10	
				Dichlorodifluoromethane	<1.0	1.0	
				Chloromethane	<1.0	1.0	
				Vinyl Chloride	<1.0	1.0	
				Bromomethane	<1.0	1.0	
				Chloroethane	<1.0	1.0	
				Trichlorofluoromethane	<1.0	1.0	
			•	2-Chloroethylvinylether	<1.0	1.0	
				Carbon Disulfide	<1.0	1.0	
				Vinyl Acetate	<1.0	1.0	
				Methyl Isobutyl Ketone	<10	10	
				2-Hexanone	<10	10	
				Acrolein	<10	10	
				Acrylonitrile	<10	10	
				Methyltertiary Butyl Ether	<1.0	1.0	
				lodomethane	<1.0	1.0	
			Surrogate Recoveries				
				1,2-Dichloroethane-d4	119	96	Recovery
				Toluene-d8	105	,,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
				4-Bromofluorobenzene	99		

(1)-Value derived from a 10x dilution.

NOTE: Chromatographic data did not indicate the presence of hydrocarbon (petroleum) contaminants.

Kurt R. Slentz_

Laboratory Manager

QUALITY ASSURANCE DATA

			•		
Method Blank	8260 LONG				RH:05-14-96
			<u>μα/L</u>	PQL	NH:05-14-96
		1,1-Dichloroethene	<1.0	1.0	
		Methylene Chloride	<1.0	1.0	
		trans-1,2-Dichloroethene	<1.0	1.0	
• •		1,1-Dichloroethane	<1.0	1.0	
		2,2-Dichloropropane	<1.0	1.0	
		cis-1,2-Dichloroethene	<1.0	1.0	
		Bromochloromethane	<1.0	1.0	
		Chloroform	<1.0	1.0	
		1,1,1-Trichloroethane	<1.0	1.0	
		Carbon Tetrachloride	<1.0	1.0	
		1,1-Dichloropropene	<1.0	1.0	
		Benzene	<1.0	1.0	
		1,2-Dichloroethane	<1.0	1.0	
		Trichloroethene	<1.0	1.0	
		1,2-Dichloropropane	<1.0	1.0	
		Dibromomethane	<1.0	1.0	
		Bromodichloromethane	<1.0	1.0	
		Trans-1,3-Dichloropropene	<1.0	1.0	
		Toluene	<1.0	1.0	
		cis-1,3-Dichloropropene	<1.0	1.0	
		1,1,2-Trichloroethane	<1.0	1.0	
		Tetrachloroethene	<1.0	1.0	
		1,3-Dichloropropane	<1.0	1.0	
		Dibromochloromethane 1,2-Dibromoethane	<1.0	1.0	•
		Chlorobenzene	<1.0	1.0	
		1,1,1,2-Tetrachloroethane	<1.0	1.0	
		Ethylbenzene	<1.0 <1.0	1.0	
		M+P Xylenes	<1.0	1.0	
		O-Xylene		1.0	
		Styrene	<1.0 <1.0	1.0	
		Bromoform	<1.0	1.0 1.0	
		lsopropylbenzene	<1.0	1.0	
		Bromobenzene	<1.0	1.0	
		1,1,2,2-Tetrachloroethane	<1.0	1.0	
		1,2,3-Trichloropropane	<1.0	1.0	
		n-Propylbenzene	<1.0	1.0	
		2-Chlorotoluene	<1.0	1.0	
		4-Chlorotoluene	<1.0	1.0	
•		1,3,5-Trimethylbenzene	<1.0	1.0	
		tert-Butylbenzene	<1.0	1.0	
		1,2,4-Trimethylbenzene	<1.0	1.0	
		sec-Butylbenzene	<1.0	1.0	
		1,3-Dichlorobenzene	<1.0	1.0	
		1,4-Dichlorobenzene	<1.0	1.0	
		p-Isopropyltoluene	<1.0	1.0	
		1,2-Dichlorobenzene	<1.0	1.0	
		n-Butylbenzene	<1.0	1.0	
		1,2-Dibromo-3-Chloropropane	<1.0	1.0	
		1,2,4-Trichlorobenzene	<1.0	1.0	
		Naphthalene	<1.0	1.0	
		Hexachlorobutadiene	<1.0	1.0	*
		1,2,3-Trichlorobenzene	<1.0	1.0	
	,	Acetone	<20	20	
		Methyl Ethyl Ketone	<10	10	
•		Dichlorodifluoromethane Chloromethane	<1.0	1.0	
			<1.0	1.0	
		Vinyl Chloride	<1.0	1.0	
		Bromomethane Chloroethane	<1.0	1.0	
		Trichlorofluoromethane	<1.0 <1.0	1.0	
		2-Chloroethylvinylether		1.0	
		Carbon Disulfide	<1.0 <1.0	1.0 1.0	
		Vinyl Acetate	<1.0	1.0	,
		Methyl Isobutyl Ketone	<10	1.0	
		2-Hexanone	<10	10	
		Acrolein	<10	10	
		Acrylonitrile	<10	10	
		Methyltertiary Butyl Ether	<1.0	1.0	
		Iodomethane	<1.0	1.0	
	Surrogate Recoveries			•••	
	_	1,2-Dichloroethane-d4	101	% R	covery
		Toluene-d8	116		•
		4-Bromofluorobenzene	107		
		2 2			

QUALITY ASSURANCE DATA

Trip Blank	8260 LONG				RH:05-14-96
		4.60	<u>να/L</u>	POL	
		1,1-Dichioroethene Methylene Chioride	<1.0 <1.0	1.0 1.0	
		trans-1,2-Dichloroethene	<1.0	1.0	
•		1,1-Dichloroethane	<1.0	1.0	
		2,2-Dichloropropane	<1.0	1.0	
		cis-1,2-Dichloroethene Bromochloromethane	<1.0 <1.0	1.0 1.0	
		Chloroform	<1.0	1.0	
		1,1,1-Trichloroethane	<1.0	1.0	
		Carbon Tetrachloride	<1.0	1.0	
		1,1-Dichloropropene	<1.0	1.0	
		Benzene	<1.0	1.0	
		1,2-Dichloroethane Trichloroethene	<1.0 <1.0	1.0 1.0	
		1,2-Dichloropropane	<1.0	1.0	
		Dibromomethane	<1.0	1.0	
		Bromodichloromethane	<1.0	1.0	
		Trans-1,3-Dichloropropene	<1.0	1.0	
		Toluene	<1.0	1.0	
		cis-1,3-Dichloropropene 1,1,2-Trichloroethane	<1.0 <1.0	1.0 1.0	
		Tetrachloroethene	<1.0	1.0	
		1,3-Dichloropropane	<1.0	1.0	
		Dibromochloromethane	<1.0	1.0	
		1,2-Dibromoethane	<1.0	1.0	
		Chlorobenzene 1,1,1,2-Tetrachloroethane	<1.0 <1.0	1.0 1.0	
		Ethylbenzene	<1.0	1.0	
		M+P Xylenes	<1.0	1.0	
		O-Xylene	<1.0	1.0	
		Styrene	<1.0	1.0	
		Bromoform Isopropylbenzene	<1.0 <1.0	1.0 1.0	
		Bromobenzene	<1.0	1.0	
		1,1,2,2-Tetrachloroethane	<1.0	1.0	
		1,2,3-Trichloropropane	<1.0	1.0	
		n-Propylbenzene	<1.0	1.0	
		2-Chlorotoluene 4-Chlorotoluene	<1.0 <1.0	1.0 1.0	
		1,3,5-Trimethyfbenzene	<1.0	1.0	
		tert-Butyfbenzene	<1.0	1.0	
		1,2,4-Trimethylbenzene	<1.0	1.0	
		sec-Butylbenzene	<1.0	1.0	
		1,3-Dichlorobenzene 1,4-Dichlorobenzene	<1.0 <1.0	1.0 1.0	
		p-Isopropyltoluene	<1.0	1.0	
		1,2-Dichlorobenzene	<1.0	1.0	
		n-Butylbenzene	<1.0	1.0	
		1,2-Dibromo-3-Chloropropane	<1.0	1.0	
		1,2,4-Trichlorobenzene Naphthalene	<1.0 <1.0	1.0 1.0	
		Hexachlorobutadiene	<1.0	1.0	
		1,2,3-Trichlorobenzene	<1.0	1.0	
		Acetone	<20	20	
		Methyl Ethyl Ketone Dichlorodifluoromethane	<10 <1.0	10 1.0	
		Chloromethane	<1.0	1.0	
		Vinyl Chloride	<1.0	1.0	
		Bromomethane	<1.0	1.0	
		Chloroethane	<1.0	1.0	
		Trichlorofluoromethane	<1.0 <1.0	1.0 1.0	
		2-Chloroethylvinylether Carbon Disulfide	<1.0 <1.0	1.0	
		Vinyl Acetate	<1.0	1.0	
		Methyl Isobutyl Ketone	< 10	10	
		2-Hexanone	<10	10	
		A crolein	<10	10 10	
		Acrylonitrile Methyltertiary Butyl Ether	<10 <1.0	1.0	
		lodomethane	<1.0	1.0	
	Surrogate Recoveries				
		1,2-Dichloroethane-d4	120	% Re	covery
		Toluene-d8	104		

4-Bromofiuorobenzene

105

Received for laboratory by (signature): Received by (signature): PLEASE PRINT OR TYPE ALL INFORMATION EXCEPT SIGNATURES Comments, Special Instructions, etc. RAPIO TURNAROUND Тіте Time Date Date CHAIN OF CUSTODY RECORD Relinquished (signature) Relinquished (signature) 0928 besseupels sievienh Sample Type: A W S U U O Air <u>W</u>ater <u>S</u>oils/solids <u>Veg</u>etation Unne <u>O</u>ther į 3 2 number of containers Received by: (signature) Received by: (signature) PRIDE HAWAAL Sampler's signature # DISCHARGE 605-342-1225 605-342-1397 Птв Тітв voice fax PRIDE HANGAR SITE 5/14/96 ELLSWORTH AFB 610 Farnwood Street Project Name / Address ENERGY LABORATORIES, INC. MACHIN Invoice to: composite grab sample B pog 3: Relinquished (signature) Contact Name & Phone P.O. Box 2470 610 Rapid City, SD 57709 JAMES 15:40 TIME 1 24E1/5 P.O. # 12/13/18 DATE C-11



ENERGY LABORATORIES, INC.P.O. BOX 2470 • RAPID CITY, SD 57709 • PHONE (605) 342-1225
610 FARNWOOD STREET • RAPID CITY, SD 57701 • FAX (605) 342-1397

James Machin Radian Corporation P.O. Box 201088 Austin, TX 78720-1088

Ellsworth AFB, Pride Hangar

May 24, 1996 96-23352-55

Sampled: 05-14/15-96

Submitted: 05-16-96

Site	Depth	Lab No.	Methodology	Analysis	Results	Units	Analyzed

Water Analysis

Effluent Discharge No. 2 96-23352 8260 LONG

				RH:05-22-9
	<u>₽9/</u> L		POL	
1,1-Dichloroethene	<1.0		1.0	
Methylene Chloride	<1.0		1.0	
trans-1,2-Dichloroethene	<1.0		1.0	
1,1-Dichloroethane	<1.0		1.0	
2,2-Dichloropropane	<1.0		1.0	
cis-1,2-Dichloroethene	< 1.0	(2)	1.0	
Bromochloromethane	<1.0		1.0	
Chloroform	<1.0		1.0	
1,1,1-Trichloroethane	<1.0		1.0	
Carbon Tetrachloride	<1.0		1.0	
1,1-Dichloropropene	< 1.0		1.0	
Benzene	<1.0		1.0	
1,2-Dichloroethane	< 1.0		1.0	
Trichloroethene	37	(1)	1.0	
1,2-Dichloropropane	< 1.0		1.0	
Dibromomethane	< 1.0		1.0	
Bromodichloromethane	< 1.0		1.0	
Trans-1,3-Dichloropropene	< 1.0		1.0	
Toluene	< 1.0		1.0	
cis-1,3-Dichloropropene	<1.0		1.0	
1,1,2-Trichloroethane	< 1.0		1.0	
Tetrachloroethene	< 1.0		1.0	
1,3-Dichloropropane	< 1.0		1.0	
Dibromochloromethane	< 1.0		1.0	
1,2-Dibromoethane	< 1.0		1.0	
Chlorobenzene	< 1.0		1.0	
1,1,1,2-Tetrachloroethane	< 1.0		1.0	
Ethylbenzene	< 1.0		1.0	
M+P Xylenes	< 1.0		1.0	
0-Xylene	< 1.0		1.0	
Styrene	< 1.0		1.0	
Bromoform	< 1.0		1.0	
Isopropylbenzene	< 1.0		1.0	
Bromobenzene	<1.0		1.0	
1.1.2.2-Tetrachloroethane	<1.0		1.0	
1,2,3-Trichloropropane	<1.0		1.0	
n-Propylbenzene	<1.0		1.0	
2-Chlorotoluene	<1.0		1.0	
4-Chlorotoluene	<1.0		1.0	
1,3,5-Trimethylbenzene	<1.0		1.0	
tert-Butylbenzene	<1.0		1.0	
1,2,4-Trimethylbenzene	<1.0		1.0	
sec-Butylbenzene	<1.0		1.0	
1,3-Dichlorobenzene	<1.0		1.0	
1,4-Dichlorobenzene	<1.0		1.0	
p-Isopropyltoluene	<1.0		1.0	
1,2-Dichlorobenzene	<1.0		1.0	
n-Butylbenzene	<1.0		1.0	
1,2-Dibromo-3-Chloropropane	<1.0		1.0	
1.2.4-Trichlorobenzene	<1.0		1.0	
Naphthalene	<1.0		1.0	
Hexachlorobutadiene	<1.0		1.0	
VARIO HOI COLLICITO	\ 1.0		1.0	

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Site	Depth	Lab No.	Methodology	Analysis	Results	Units	Analyzed
fluent Dis	charge No.	2 96-23352	8260 LONG	•			RH:05-22
					μg/L	POL	
				1,2,3-Trichlorobenzene	<1.0	1.0	
				Acetone	<20	20	
				Methyl Ethyl Ketone	<10	(2) 10	
				Dichlorodifluoromethane	<1.0	1.0	
				Chloromethane	<1.0	1.0	
				Vinyl Chloride	<1.0	1.0	
				Bromomethane	<1.0	1.0	
			•	Chloroethane	<1.0	1.0	
		·	•	Trichlorofluoromethane	<1.0	1.0	
				2-Chloroethylvinylether	<1.0	1.0	
				Carbon Disulfide	<1.0	1.0	
				Vinyl Acetate	<1.0	1.0	
				Methyl Isobutyl Ketone	<10	10	
				2-Hexanone	<10	10	
				Acrolein	<10	10	
				Acrylonitrile	<10	10	
				Methyltertiary Butyl Ether	<1.0	1.0	
		•		Iodomethane	<1.0	1.0	
		•	Surrogate Recoveries				
				1,2-Dichloroethane-d4	103		% Recovery
				Toluene-d8	100		•
				4-Bromofluorobenzene	99		

⁽¹⁾⁻Value derived from a 10x dilution. (2)-Present but less than the PQL.

Site	Depth	Lab No.	Methodology	Analysis	Results		Units	Analyzed
		·						
fluent Dis	charge No.	3 96-2335	3 8260 LONG					RH:05-22-9
				1,1-Dichloroethene	<i>μ</i> g/L <1.0		POL	
				Methylene Chloride	<1.0		1.0 1.0	
				trans-1,2-Dichloroethene	<1.0		1.0	
				1,1-Dichloroethane	<1.0		1.0	
				2,2-Dichloropropane	<1.0		1.0	
				cis-1,2-Dichloroethene Bromochloromethane	<1.0 <1.0	(2)	1.0 1.0	
				Chioroform	<1.0		1.0	
				1,1,1-Trichloroethane	<1.0		1.0	
				Carbon Tetrachloride	<1.0		1.0	
				1,1-Dichloropropene Benzene	<1.0 <1.0		1.0 1.0	
				1,2-Dichloroethane	<1.0		1.0	
				Trichloroethene	56	(1)	1.0	
				1,2-Dichloropropane	< ₺0		1.0	
				Dibromomethane	<1.0		1.0	
				Bromodichloromethane Trans-1,3-Dichloropropene	<1.0 <1.0		1.0 1.0	
				Toluene	<1.0		1.0	
				cis-1,3-Dichloropropene	<1.0		1.0	
				1,1,2-Trichloroethane	<1.0		1.0	
				Tetrachloroethene 1,3-Dichloropropane	<1.0 <1.0		1.0 1.0	
				Dibromochloromethane	<1.0		1.0	
				1,2-Dibromoethane	<1.0		1.0	
				Chlorobenzene	<1.0		1.0	
				1,1,1,2-Tetrachloroethane Ethylbenzene	<1.0 <1.0		1.0 1.0	
				M+P Xylenes	<1.0		1.0	
				O-Xylene	<1.0		1.0	
				Styrene	<1.0		1.0	
				Bromoform Isopropylbenzene	<1.0 <1.0		1.0 1.0	
				Bromobenzene	<1.0		1.0	
				1,1,2,2-Tetrachloroethane	<1.0		1.0	
				1,2,3-Trichloropropane	<1.0		1.0	
				n-Propyibenzene 2-Chiorotoluene	<1.0 <1.0		1.0 1.0	
				4-Chlorotoluene	<1.0		1.0	
				1,3,5-Trimethylbenzene	<1.0		1.0	
				tert-Butylbenzene 1,2,4-Trimethylbenzene	<1.0 <1.0		1.0 1.0	
				sec-Butylbenzene	<1.0		1.0	
				1,3-Dichlorobenzene	<1.0		1.0	
				1,4-Dichlorobenzene	<1.0		1.0	
				p-Isopropyltoluene 1,2-Dichlorobenzene	<1.0 <1.0		1.0 1.0	
				n-Butylbenzene	<1.0		1.0	
				1,2-Dibromo-3-Chloropropan			1.0	
				1,2,4-Trichlorobenzene Naphthalene	<1.0 <1.0		1.0 1.0	
				Hexachlorobutadiene	<1.0 <1.0		1.0	
				1,2,3-Trichlorobenzene	<1.0		1.0	
				Acetone	<20		20	
				Methyl Ethyl Ketone Dichlorodifluoromethane	<10 <1.0		10 1.0	
				Chloromethane	<1.0		1.0	
				Vinyl Chloride	< 1.0		1.0	
				Bromomethane Chloroethane	<1.0		1.0	
				Trichlorofluoromethane	<1.0 <1.0		1.0 1.0	
				2-Chloroethylvinylether	<1.0		1.0	
				Carbon Disulfide	<1.0		1.0	
				Vinyi Acetate Methyi Isobutyi Ketone	<1.0 <10		1.0 10	
•				2-Hexanone	< 10 < 10		10	
				Acrolein	<10		10	
				Acrylonitrile	<10		10	
				Methyltertiary Butyl Ether lodomethane	<1.0 <1.0		1.0 1.0	
			Surrogate Recoveries	iouristidia	< 1.0		1.0	
				1,2-Dichloroethane-d4	103		%	Recovery
				Toluene-d8	102			

⁽¹⁾⁻Value derived from a 10x dilution. (2)-Present but less than the PQL.

Site Depth	Lab No. Metho	lology Analysis	Results	Units	Analyzed
			· .		
uent Discharge No.	96-23354 8260	LONG	•		RH:05-22-
			<u> </u>	POL	
		1,1-Dichloroethene	<1.0	1.0	
		Methylene Chloride trans-1,2-Dichloroeth	<1.0 ene <1.0	1.0 1.0	
		1,1-Dichloroethane	<1.0	1.0	
		2,2-Dichloropropane	<1.0	1.0	
		cis-1,2-Dichloroethen			
		Bromochloromethane Chloroform	<1.0 <1.0	1.0 1.0	
		1,1,1-Trichloroethane		1.0	
		Carbon Tetrachloride		1.0	
		1,1-Dichloropropene	<1.0	1.0	
		Benzene 1,2-Dichloroethane	<1.0 <1.0	1.0	
		Trichloroethene	34 (1)	1.0 1.0	
	•	1,2-Dichloropropane	<1.0	1.0	
		Dibromomethane	<1.0	1.0	
		Bromodichloromethan		1.0	
		Trans-1,3-Dichloropro Toluene	opene <1.0 <1.0	1.0 1.0	
		cis-1,3-Dichloroprope		1.0	
		1,1,2-Trichloroethane		1.0	
		Tetrachloroethene	<1.0	1.0	
•		1,3-Dichloropropane Dibromochloromethar	<1,0 ne <1.0	1.0 1.0	
	•	1,2-Dibromoethane	<1.0	1.0	
		Chlorobenzene	<1.0	1.0	
		1,1,1,2-Tetrachloroet		1.0	
		Ethylbenzene M+P Xylenes	<1.0 <1.0	1.0 1.0	
		0-Xylene	<1.0	1.0	
		Styrene	<1.0	1.0	
		Bromoform	<1.0	1.0	
		Isopropylbenzene Bromobenzene	<1.0 <1.0	1.0 1.0	
		1,1,2,2-Tetrachloroet		1.0	
		1,2,3-Trichloropropar		1.0	
		n-Propylbenzene	<1.0	1.0	
		2-Chlorotoluene 4-Chlorotoluene	<1.0 <1.0	1.0 1.0	
		1,3,5-Trimethylbenze		1.0	
		tert-Butylbenzene	<1.0	1.0	
		1,2,4-Trimethylbenze		1.0	
		sec-Butylbenzene 1,3-Dichlorobenzene	<1.0 <1.0	1.0 1.0	
		1,4-Dichlorobenzene	<1.0	1.0	
		p-Isopropyltoluene	<1.0	1.0	
		1,2-Dichlorobenzene n-Butylbenzene	<1.0 <1.0	1.0	
•		1,2-Dibromo-3-Chloro		1.0 1.0	
		1,2,4-Trichlorobenzer	•	1.0	
		Naphthalene	<1.0	1.0	
		Hexachlorobutadiene 1,2,3-Trichlorobenzer	<1.0 ne <1.0	1.0 1.0	
		Acetone	<20	20	
		Methyl Ethyl Ketone	<10	10	
		Dichlorodifluorometha		1.0	
		Chloromethane Vinyl Chloride	<1.0 <1.0	1.0 1.0	
		Bromomethane	<1.0	1.0	
		Chloroethane	<1.0	1.0	
		Trichlorofluoromethan		1.0	
		2-Chloroethylvinyleth Carbon Disulfide	er <1.0 <1.0	1.0 1.0	
		Vinyl Acetate	<1.0	1.0	
	•	Methyl Isobutyl Keto	one <10	10	
		2-Hexanone	<10	10	
		Acrolein Acrylonitrile	* <10 <10	10 10	
		Methyltertiary Butyl		1.0	
	_	Iodomethane	<1.0	1.0	
	Surrogate	Recoveries	4 404		D
•		1,2-Dichloroethane-d- Toluene-d8	4 101 99	%	Recovery

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Site	Depth	Lab No.	Methodology	Analysis	Results	Units	. Analyzed
Cffluent Di	iaahaasa Nis	F 00 000FF					
tilluent Di	scharge No.	5 96-23355	8260 LONG				RH:05-23-96
				1,1-Dichloroethene	<u>μα/L</u> <1.0	POL	
				Methylene Chloride	<1.0	1.0 1.0	
				trans-1,2-Dichloroethene	<1.0	1.0	
				1,1-Dichloroethane	<1.0	1.0	
				2,2-Dichloropropane cis-1,2-Dichloroethene	<1.0	1.0	
				Bromochloromethane	<1.0 (2 <1.0	1.0 1.0	
				Chloroform	<1.0	1.0	
				1,1,1-Trichloroethane	<1.0	1.0	
				Carbon Tetrachloride	<1.0	1.0	
				1,1-Dichloropropene Benzene	<1.0	1.0	
				1,2-Dichloroethane	<1.0 <1.0	1.0 1.0	
				Trichloroethene	78 (1		
				1,2-Dichloropropane	<1.0	1.0	
				Dibromomethane	<1.0	1.0	
				Bromodichloromethane Trans-1,3-Dichloropropene	<1.0	1.0	
				Toluene	<1.0 <1.0	1.0 1.0	
				cis-1,3-Dichloropropene	<1.0	1.0	
				1,1,2-Trichloroethane	<1.0	1.0	
				Tetrachioroethene	<1.0	1.0	
				1,3-Dichloropropane Dibromochloromethane	<1.0 <1.0	1.0	
				1,2-Dibromoethane	<1.0	1.0 1.0	
				Chlorobenzene	<1.0	1.0	
				1,1,1,2-Tetrachloroethane	<1.0	1.0	
				Ethylbenzene	<1.0	1.0	
				M + P Xylenes O-Xylene	<1.0 <1.0	1.0 1.0	
				Styrene	<1.0	1.0	
				Bromoform	<1.0	1.0	
				Isopropylbenzene	<1.0	1.0	
				Bromobenzene 1,1,2,2-Tetrachloroethane	<1.0	1.0	
				1,2,3-Trichloropropane	<1.0 <1.0	1.0 1.0	
				n-Propytbenzene	<1.0	1.0	
				2-Chlorotoluene	<1.0	1.0	
				4-Chlorotoluene 1,3,5-Trimethylbenzene	<1.0	1.0	
				tert-Butylbenzene	<1.0 <1.0	1.0 1.0	
				1,2,4-Trimethylbenzene	<1.0	1.0	
				sec-Butylbenzene	<1.0	1.0	
				1,3-Dichlorobenzene	<1.0	1.0	
				1,4-Dichlorobenzene p-Isopropyltoluene	<1.0	1.0	
				1,2-Dichlorobenzene	<1.0 <1.0	1.0 1.0	
				n-Butylbenzene	<1.0	1.0	
				1,2-Dibromo-3-Chloropropane		1.0	
				1,2,4-Trichlorobenzene	<1.0	1.0	
				Naphthalene Hexachlorobutadiene	<1.0 <1.0	1.0 1.0	
				1,2,3-Trichlorobenzene	<1.0	1.0	
				Acetone	<20	20	
				Methyl Ethyl Ketone	<10	10	
				Dichlorodifluoromethane	<1.0	1.0	
				Chloromethane Vinyl Chloride	<1.0 <1.0	1.0 1.0	
				Bromomethane	<1.0	1.0	
				Chloroethane	<1.0	1.0	
				Trichlorofluoromethane	<1.0	1.0	
				2-Chloroethylvinylether	<1.0	1.0	

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Site	Depth	Lab No.	Methodology	Analysis	Results	Units	Analyzed
Selvana Dia	ahasaa Na	E 06 2225					
inident Dis	charge No.	5 96-23355	8260 LONG		<u>μα/L</u>	POL	RH:05-23-96
				Carbon Disulfide	<1.0	1.0	
				Viny! Acetate	<1.0	1.0	
				Methyl Isobutyl Ketone	<10	10	
				2-Hexanone	<10	10	
				Acrolein	<10	10	
				Acrylonitrile	<10	10	
		•		Methyltertiary Butyl Ether	<1.0	1.0	
				lodomethane	<1.0	1.0	
			Surrogate Recoveries				•
			-	1,2-Dichloroethane-d4	102	%	Recovery
				Toluene-d8	101		· · ·
				4-Bromofluorobenzene	100		
		-Value derived fre-	om a 10x dilution. than the PQL.				

Kurt R. Slentz

Laboratory Manager <

Site Depth Lab No. Methodology Analysis Results Units Analyzed

Method Blank	8260 LONG		μg/L	PQL	RH:05-22-96
		1,1-Dichloroethene	<1.0	1.0	
		Methylene Chloride	<1.0	1.0	
		trans-1,2-Dichloroethene	<1.0	1.0	
		1,1-Dichloroethane	<1.0	1.0	
		2,2-Dichloropropane cis-1,2-Dichloroethene	<1.0 <1.0	1.0 1.0	
		Bromochloromethane	<1.0	1.0	
		Chloroform	<1.0	1.0	
		1,1,1-Trichloroethane	<1.0	1.0	
		Carbon Tetrachioride	<1.0	1.0	
		1,1-Dichloropropene	<1.0	1.0	
		Benzene	<1.0	1.0	
		1,2-Dichloroethane Trichloroethene	<1.0 <1.0	1.0 1.0	
		1,2-Dichloropropane	<1.0	1.0	
		Dibromomethane	< 1.0	1.0	
		Bromodichloromethane	< 1.0	1.0	
		Trans-1,3-Dichloropropene	<1.0	1.0	
		Toluene	<1.0	1.0	
		cis-1,3-Dichloropropene 1,1,2-Trichloroethane	<1.0 <1.0	1.0 1.0	
		Tetrachloroethene	<1.0	1.0	
		1,3-Dichloropropane	< 1.0	1.0	
		Dibromochloromethane	<1.0	1.0	
		1,2-Dibromoethane	<1.0	1.0	
		Chlorobenzene	<1.0	1.0	
		1,1,1,2-Tetrachioroethane Ethylbenzene	<1.0 <1.0	1.0 1.0	
		M+P Xylenes	<1.0	1.0	
		O-Xylene	<1.0	1.0	
		Styrene	< 1.0	1.0	
	•	Bromoform	<1.0	1.0	
		Isopropylbenzene	<1.0	1.0	
		Bromobenzene 1,1,2,2-Tetrachloroethane	<1.0 <1.0	1.0 1.0	
	•	1,2,3-Trichloropropane	<1.0	1.0	
		n-Propylbenzene	< 1.0	1.0	
		2-Chlorotoluene	< 1.0	1.0	
		4-Chlorotoluene	<1.0	1.0	
		1,3,5-Trimethylbenzene tert-Butylbenzene	<1.0 <1.0	1.0 1.0	
		1,2,4-Trimethylbenzene	<1.0	1.0	
		sec-Butylbenzene	< 1.0	1.0	
		1,3-Dichlorobenzene	<1.0	1.0	
		1,4-Dichlorobenzene	< 1.0	1.0	
		p-Isopropyltoluene	<1.0	1.0	
		1,2-Dichlorobenzene n-Butylbenzene	<1.0 <1.0	1.0 1.0	
		1,2-Dibromo-3-Chloropropane	< 1.0	1.0	
		1,2,4-Trichlorobenzene	< 1.0	1.0	
		Naphthalene	<1.0	1.0	
		Hexachlorobutadiene	<1.0	1.0	
		1,2,3-Trichlorobenzene Acetone	<1.0 <20	1.0 20	
		Methyl Ethyl Ketone	<10	10	
		Dichlorodifluoromethane	<1.0	1.0	
		Chloromethane	<1.0	1.0	
		Vinyl Chloride	<1.0	1.0	
		Bromomethane Chloroethane	<1.0 <1.0	1.0 1.0	
		Trichlorofluoromethane	<1.0	1.0	
		2-Chloroethylvinylether	<1.0	1.0	
		Carbon Disulfide	<1.0	1.0	
		Vinyl Acetate	<1.0	1.0	
•		Methyl Isobutyl Ketone 2-Hexanone	<10 <10	10	
		2-nexanone Acrolein	<10	10 10	
		Acrylonitrile	<10	10	
		Methyltertiary Butyl Ether	<1.0	1.0	
	Companie December	Iodomethane	<1.0	1.0	
	Surrogate Recoveries	1,2-Dichloroethane-d4	94	% Reco	ven/
		Toluene-d8	106	70 IJ8CO	AOIÀ
	C-18	4-Bromofluorobenzene	106		

Site Depth Lab No. Methodology Analysis Results Units Analyzed

Marata di Mirata	0000 1 0110			DOL	
Method Blank	8260 LONG		<u>μ</u> α/L	<u>PQL</u>	RH:05-23-96
		1,1-Dichloroethene	<1.0	1.0	
		Methylene Chloride trans-1,2-Dichloroethene	<1.0 <1.0	1.0 1.0	
		1,1-Dichloroethane	<1.0	1.0	
		2,2-Dichloropropane	<1.0	1.0	
		cis-1,2-Dichloroethene	<1.0	1.0	
		Bromochloromethane	<1.0	1.0	
		Chloroform	<1.0	1.0	
		1,1,1-Trichloroethane	<1.0	1.0	
		Carbon Tetrachloride 1,1-Dichloropropene	<1.0 <1.0	1.0 1.0	
		Benzene	<1.0	1.0	
		1,2-Dichloroethane	<1.0	1.0	
		Trichloroethene	<1.0	1.0	
		1,2-Dichloropropane	<1.0	1.0	
		Dibromomethane	<1.0	1.0	
		Bromodichloromethane	<1.0	1.0	
		Trans-1,3-Dichloropropene Toluene	<1.0 <1.0	1.0 1.0	
		cis-1,3-Dichloropropene	<1.0	1.0	
		1,1,2-Trichloroethane	<1.0	1.0	
		Tetrachioroethene	< 1.0	1.0	
		1,3-Dichloropropane	< 1.0	1.0	
		Dibromochloromethane	<1.0	1.0	
		1,2-Dibromoethane	<1.0	1.0	
		Chlorobenzene	<1.0	1.0	
		1,1,1,2-Tetrachloroethane Ethylbenzene	<1.0 <1.0	1.0 1.0	
		M + P Xylenes	<1.0	1.0	
		O-Xylene	<1.0	1.0	
	•	Styrene	<1.0	1.0	
		Bromoform	<1.0	1.0	
		Isopropylbenzene	<1.0	1.0	
	•	Bromobenzene 1,1,2,2-Tetrachloroethane	<1.0 <1.0	1.0	
		1,2,3-Trichloropropane	<1.0	1.0 1.0	
		n-Propytbenzene	<1.0	1.0	
		2-Chiorotoluene	<1.0	1.0	
		4-Chlorotoluene	<1.0	1.0	
		1,3,5-Trimethylbenzene	<1.0	1.0	
		tert-Butylbenzene	<1.0	1.0	
		1,2,4-Trimethylbenzene sec-Butylbenzene	<1.0 <1.0	1.0 1.0	
		1,3-Dichlorobenzene	<1.0	1.0	
		1,4-Dichlorobenzene	<1.0	1.0	
		p-Isopropyltoluene	<1.0	1.0	
		1,2-Dichlorobenzene	<1.0	1.0	
	•	n-Butylbenzene 1,2-Dibromo-3-Chloropropane	<1.0 <1.0	1.0 1.0	
		1,2,4-Trichlorobenzene	<1.0	1.0	
		Naphthalene	<1.0	1.0	
		Hexachlorobutadiene	<1.0	1.0	
		1,2,3-Trichlorobenzene	<1.0	1.0	
		Acetone	<20	20	
		Methyl Ethyl Ketone Dichlorodifluoromethane	<10 <1.0	10 1.0	
		Chloromethane	<1.0	1.0	
		Vinyl Chloride	<1.0	1.0	
		Bromomethane	<1.0	1.0	
		Chloroethane	<1.0	1.0	
		Trichlorofluoromethane	<1.0	1.0	
		2-Chloroethylvinylether Carbon Disulfide	<1.0 <1.0	1.0 1.0	
	·	Vinyl Acetate	<1.0	1.0	
		Methyl Isobutyl Ketone	<10	10	
		2-Hexanone	<10	10	
		Acrolein	<10	10	
		Acrylonitrile	<10	10	
		Methyltertiary Butyl Ether lodomethane	<1.0 <1.0	1.0 1.0	
	Surrogate Recoveries	1000118G IGLRS	< 1.0	1.0	
		1,2-Dichloroethane-d4	100	% Rec	overy
		Toluene-d8	104		•
		4-Bromofluorobenzene	101		
	C-19)			
•	•				

Site Depth Lab No. Methodology Analysis Results Units Analyzed

				DO!	
Trip Blank	8260 LONG	4.4 Bioblesses	<u>μα/L</u>	<u>PQL</u>	RH:05-22-96
		1,1-Dichloroethene Methylene Chloride	<1.0 <1.0	1.0 1.0	
		trans-1,2-Dichloroethene	<1.0	1.0	
		1,1-Dichloroethane	<1.0	1.0	
		2,2-Dichloropropane	<1.0	1.0	
		cis-1,2-Dichloroethene	<1.0	1.0	
		Bromochloromethane	<1.0	1.0	
		Chloroform	<1.0	1.0	
		1,1,1-Trichloroethane Carbon Tetrachloride	<1.0 <1.0	1.0 1.0	
		1,1-Dichloropropene	<1.0	1.0	
		Benzene	<1.0	1.0	
		1,2-Dichloroethane	<1.0	1.0	
		Trichloroethene	<1.0	1.0	
		1,2-Dichloropropane	<1.0	1.0	
		Dibromomethane	<1.0	1.0	
		Bromodichloromethane Trans-1,3-Dichloropropene	<1.0 <1.0	1.0 1.0	
		Toluene	<1.0	1.0	
		cis-1,3-Dichloropropene	<1.0	1.0	
		1,1,2-Trichloroethane	<1.0	1.0	
		Tetrachloroethene	<1.0	1.0	
		1,3-Dichloropropane	<1.0	1.0	
		Dibromochloromethane 1,2-Dibromoethane	<1.0	1.0	
		Chlorobenzene	<1.0 <1.0	1.0 1.0	
		1,1,1,2-Tetrachloroethane	<1.0	1.0	
		Ethylbenzene	<1.0	1.0	
		M+P Xylenes	<1.0	1.0	
		O-Xylene	<1.0	1.0	
		Styrene	<1.0	1.0	
		Bromoform	<1.0	1.0	
		isopropylbenzene Bromobenzene	<1.0 <1.0	1.0 1.0	
		1,1,2,2-Tetrachloroethane	<1.0	1.0	
		1,2,3-Trichloropropane	<1.0	1.0	
		n-Propylbenzene	<1.0	1.0	
		2-Chlorotoluene	<1.0	1.0	
		4-Chlorotoluene	<1.0	1.0	
		1,3,5-Trimethylbenzene	<1.0	1.0	
		tert-Butylbenzene 1,2,4-Trimethylbenzene	<1.0 <1.0	1.0 1.0	
		sec-Butylbenzene	<1.0	1.0	
		1,3-Dichlorobenzene	<1.0	1.0	
		1,4-Dichlorobenzene	<1.0	1.0	
		p-lsopropyltoluene	<1.0	1.0	
		1,2-Dichlorobenzene	<1.0	1.0	
		n-Butylbenzene 1,2-Dibromo-3-Chloropropane	<1.0	1.0 1.0	
		1,2,4-Trichlorobenzene	<1.0 <1.0	1.0	
		Naphthalene	<1.0	1.0	
		Hexachlorobutadiene	· <1.0	1.0	
		1,2,3-Trichlorobenzene	<1.0	1.0	
		Acetone	<20	20	
		Methyl Ethyl Ketone Dichlorodifluoromethane	<10 <1.0	10 1.0	
		Chloromethane	<1.0	1.0	
		Vinyl Chloride	<1.0	1.0	
		Bromomethane	<1.0	1.0	
	•	Chloroethane	<1.0	1.0	
		Trichlorofluoromethane	<1.0	1.0	
		2-Chloroethylvinylether	<1.0	1.0	
		Carbon Disulfide Vinyl Acetate	<1.0 <1.0	1.0 1.0	
		Methyl Isobutyl Ketone	<10	10	
		2-Hexanone	<10	10	
		Acrolein	<10	10	
		Acrylonitrile	<10	10	
		Methyltertiary Butyl Ether	<1.0	1.0	
	Surrogate Recoveries	lodomethane	<1.0	1.0	
	Surrogate necoveries	1,2-Dichloroethane-d4	99	% Reco	/erv
		Toluene-d8	102	70 11300	
	C-20	4-Bromofluorobenzene	104		
•	U-20	,			

UNICE 605-342-1225 JAX GOS 742-1225 F 11-5-W CO 714 AFB ON SHARLE NO 2 ON SCHARLE NO 3 DISCHARLE NO 3 DISCHARLE NO 3 ON SHARLE NO 3 ON SCHARLE NO 3 ON SCHARLE NO 3 ON SCHARLE NO 4 ON SHARLE NO 3 ON SCHARLE NO 4 ON SHARLE NO 5 LECORD PLEASE PRINT OR TYPE ALL INFORMATION EXCEPT SIGNATURES	Comments, Special Instructions, etc.	2 Tr. p.bl.ca/(5		(signature) Date Time Received by (signature):	
UNICE 605342-1225 JOE WAYAR S ONSCHARLE NO ONSCHARLE NO DISCHARLE NO ONSCHARLE NO	CHAIN OF CUSTODY RECORD	Sample Type: A W S V U O Air Water Soils/solids Yegetation Urine Qther	7 X X X	0 0	<u>ෆ</u>
TORIB Name / Nam	voice fax	ELLSWORTH DE HAMAR SI Sampler's signature samueld.	DISCHARGE NO	DISCHARE NO.	



ENERGY LABORATORIES, INC.

P.O. BOX 2470 • RAPID CITY, SD 57709 • PHONE (605) 342-1225 610 FARNWOOD STREET • RAPID CITY, SD 57701 • FAX (605) 342-1397

James Machin Radian Corporation P.O. Box 201088 Austin, TX 78720-1088

Ellsworth AFB, Pride Hangar

May 22, 1996 96-23373-76

Sampled: 05-16-96

Submitted: 05-17-96

Site	Depth	Lab No.	Methodology	Analysis	Results	Units	Analyzed
L							

Water Analysis

Effluent Discharge #6 96-23373 8260 LONG RH:05-20-96

				RH:05-2
		<u>ν</u> α/Γ	POL	
1,1-Dichloroethen		<1.0	1.0	
Methylene Chloric		<1.0	1.0	
trans-1,2-Dichloro		<1.0	1.0	
1,1-Dichloroethan		<1.0	1.0	
2,2-Dichloropropa		<1.0	1.0	
cis-1,2-Dichloroet		1.4	1.0	
Bromochlorometh	ane	<1.0	1.0	
Chloroform		<1.0	1.0	
1,1,1-Trichloroeth		<1.0	1.0	
Carbon Tetrachio		<1.0	1.0	
1,1-Dichloroprope	ne	<1.0	1.0	
Benzene		< 1.0	1.0	
1,2-Dichloroethan	e	< 1.0	1.0	
Trichloroethene		78	(1) 1.0	
1,2-Dichloropropa	ne	<1.0	1.0	
Dibromomethane		< 1.0	1.0	
Bromodichloromet	hane	<1.0	1.0	
Trans-1,3-Dichlore	propene	< 1.0	1.0	
Toluene		<1.0	1.0	
cis-1,3-Dichloropri	opene	<1.0	1.0	
1,1,2-Trichloroeth	ane	<1.0	1.0	
Tetrachloroethene		< 1.0	1.0	
1,3-Dichloropropa	ne	< 1.0	1.0	
Dibromochloromet	hane	< 1.0	1.0	
1,2-Dibromoethan	e	<1.0	1.0	
Chlorobenzene		<1.0	1.0	
1,1,1,2-Tetrachlo	roethane	< 1.0	1.0	
Ethylbenzene		< 1.0	1.0	
M + P Xylenes		< 1.0	1.0	
O-Xylene		< 1.0	1.0	
Styrene		< 1.0	1.0	
Bromoform		< 1.0	1.0	
Isopropylbenzene		< 1.0	1.0	
Bromobenzene		< 1.0	1.0	
1,1,2,2-Tetrachlor	roethane	< 1.0	1.0	
1,2,3-Trichloropro	pane	< 1.0	1.0	
n-Propylbenzene		< 1.0	1.0	
2-Chloratoluene		<1.0	1.0	
4-Chlorotoluene		<1.0	1.0	
1,3,5-Trimethylbe	nzene	<1.0	1.0	
tert-Butylbenzene		< 1.0	1.0	
1,2,4-Trimethylbe	nzene	<1.0	1.0	
sec-Butylbenzene		<1.0	1.0	
1,3-Dichlorobenze		<1.0	1.0	•
1,4-Dichlorobenze	ne	<1.0	1.0	
p-Isopropyltoluene		<1.0	1.0	
1,2-Dichlorobenze	ne	<1.0	1.0	
n-Butylbenzene		<1.0	1.0	
1,2-Dibromo-3-Ch	loropropane	<1.0	1.0	
1,2,4-Trichlorober	izen e	<1.0	1.0	
Naphthalene		<1.0	1.0	
Hexachlorobutadie	ne	<1.0	1.0	

Site Depth Li	ab No.	Methodology	Analysis	Results	Units	Analyzed
						•
ffluent Discharge #6	96-23373	8260 LONG				RH:05-20-
			4.0.07141	<u>να/L</u>	POL	
			1,2,3-Trichlorobenzene Acetone	<1.0 <20	1.0	
			Methyl Ethyl Ketone	<10	20 10	
			Dichlorodifluoromethane	<1.0	1.0	
			Chloromethane	<1.0	1.0	
			Vinyl Chloride	<1.0	1.0	
			Bromomethane	<1.0	1.0	
			Chloroethane	<1.0	1.0	
			Trichlorofluoromethane	<1.0	1.0	
			2-Chloroethylvinylether Carbon Disulfide	<1.0 <1.0	1.0 1.0	
			Vinyl Acetate	<1.0	1.0	
			Methyl Isobutyl Ketone	<10	10	
			2-Hexanone	<10	10	
			Acrolein	<10	10	
			Acrylonitrile	<10	10	
			Methyltertiary Butyl Ether	<1.0	1.0	
		,	lodomethane	<1.0	1.0	
	,	Surrogate Recoveries				
		•	1,2-Dichloroethane-d4	97		% Recovery
			Toluene-d8	102		•
			4-Bromofluorobenzene	101		
(1)-Val	lue derived from	m a 10x dilution.				
/-1 Post Test	96-23374	8260 LONG				RH:05-20-
				<u>μg/L</u>	POL	1111.03-20
			1,1-Dichloroethene	<1.0	1.0	
•			Methylene Chloride	<1.0	1.0	
			trans-1,2-Dichloroethene	<1.0	1.0	
			1,1-Dichloroethane 2,2-Dichloropropane	<1.0 <1.0	1.0 1.0	
			cis-1,2-Dichloroethene	3.3	1.0	
			Bromochloromethane	<1.0	1.0	
			Chloroform	<1.0	1.0	
			1 1 1 Triablamathana	<1.0	1.0	
			1,1,1-Trichloroethane			
			Carbon Tetrachloride	<1.0	1.0	
			Carbon Tetrachloride 1,1-Dichloropropene	<1.0 <1.0	1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene	<1.0 <1.0 <1.0	1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene	<1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane	<1.0 <1.0 <1.0	1.0 1.0 1.0 1.0	
		•	Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane	<1.0 <1.0 <1.0 <1.0 410 (1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0	
		•	Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene	<1.0 <1.0 <1.0 <1.0 410 (** <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethane 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethene 1,3-Dichloropropane	<1.0 <1.0 <1.0 <1.0 <1.0 410 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethene 1,3-Dichloropropane Dibromochloromethane	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethane 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethene 1,3-Dichloropropane Dibromochloromethane 1,2-Dibromoethane	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethane 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethene 1,3-Dichloropropane Dibromochloromethane 1,2-Dibromoethane Chlorobenzene	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethene 1,3-Dichloropropane Dibromochloromethane 1,2-Dibromoethane Chlorobenzene 1,1,1,2-Tetrachloroethane	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethane 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethene 1,3-Dichloropropane Dibromochloromethane 1,2-Dibromoethane Chlorobenzene	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethene 1,3-Dichloropropane Dibromochloromethane 1,2-Dibromoethane Chlorobenzene 1,1,1,2-Tetrachloroethane Ethylbenzene	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
	. •		Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethene 1,3-Dichloropropane Dibromochloromethane Chlorobenzene 1,1,1,2-Tetrachloroethane Ethylbenzene M+P Xylenes	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
	. •		Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethene 1,3-Dichloropropane Dibromochloromethane Chlorobenzene 1,1,1,2-Tetrachloroethane Ethylbenzene M+P Xylenes O-Xylene Styrene Bromoform	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethene 1,3-Dichloropropane Dibromochloromethane Chlorobenzene 1,1,1,2-Tetrachloroethane Ethylbenzene M+P Xylenes O-Xylene Styrene Bromoform Isopropylbenzene	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
	. •		Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethane Tetrachloroethane 1,3-Dichloropropane Dibromochloromethane 1,2-Dibromoethane Chlorobenzene 1,1,1,2-Tetrachloroethane Ethylbenzene M+P Xylenes O-Xylene Styrene Bromoform Isopropylbenzene Bromobenzene	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethane Tetrachloroethane 1,3-Dichloropropane Dibromochloromethane 1,2-Dibromoethane Chlorobenzene 1,1,1,2-Tetrachloroethane Ethylbenzene M+P Xylenes O-Xylene Styrene Bromoform Isopropylbenzene Bromoform Isopropylbenzene Bromobenzene 1,1,2,2-Tetrachloroethane	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethane Tetrachloroethane 1,3-Dichloropropane Dibromochloromethane 1,2-Dibromoethane Chlorobenzene 1,1,1,2-Tetrachloroethane Ethylbenzene M+P Xylenes O-Xylene Styrene Bromoform Isopropylbenzene Bromobenzene 1,1,2,2-Tetrachloroethane 1,2,3-Trichloropropane	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
			Carbon Tetrachloride 1,1-Dichloropropene Benzene 1,2-Dichloroethane Trichloroethene 1,2-Dichloropropane Dibromomethane Bromodichloromethane Trans-1,3-Dichloropropene Toluene cis-1,3-Dichloropropene 1,1,2-Trichloroethane Tetrachloroethane Tetrachloroethane 1,3-Dichloropropane Dibromochloromethane 1,2-Dibromoethane Chlorobenzene 1,1,1,2-Tetrachloroethane Ethylbenzene M+P Xylenes O-Xylene Styrene Bromoform Isopropylbenzene Bromoform Isopropylbenzene Bromobenzene 1,1,2,2-Tetrachloroethane	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	

Page 3 of 8

Site Depth	Lab No.	Methodology	Analysis	Results	Units	Analyzed
W-1 Post Test	96-23374	8260 LONG			201	RH:05-20-9
			1,3,5-Trimethylbenzene	<u>μ</u> α/L <1.0	<u>PQL</u> 1.0	
			tert-Butylbenzene	<1.0	1.0	
			1,2,4-Trimethylbenzene	<1.0	1.0	
			sec-Butylbenzene	<1.0	1.0	
			1,3-Dichlorobenzene 1,4-Dichlorobenzene	<1.0 <1.0	1.0 1.0	
			p-Isopropyttoluene	<1.0	1.0	
			1,2-Dichlorobenzene	<1.0	1.0	
			n-Butylbenzene	<1.0	1.0	
			1,2-Dibromo-3-Chloropropane		1.0	
			1,2,4-Trichlorobenzene Naphthalene	<1.0 <1.0	1.0	
			Hexachlorobutadiene	<1.0	1.0 1.0	
			1,2,3-Trichlorobenzene	<1.0	1.0	
			Acetone	<20	20	
			Methyl Ethyl Ketone	50	10	
			Dichlorodifluoromethane Chloromethane	<1.0	1.0	
			Vinyl Chloride	<1.0 <1.0	1.0 1.0	
			Bromomethane	<1.0	1.0	
			Chloroethane	<1.0	1.0	
			Trichlorofluoromethane	<1.0	1.0	
			2-Chloroethylvinylether	<1.0	1.0	
			Carbon Disulfide Vinyl Acetate	<1.0 <1.0	1.0 1.0	
			Methyl Isobutyl Ketone	<10	10	
			2-Hexanone	<10	10	
			Acrolein	<10	10	
			Acrylonitrile	<10	10	
			Methyltertiary Butyl Ether lodomethane	<1.0 <1.0	1.0 1.0	
	5	Surrogate Recoveries	4.0 Distance 44	400		_
			1,2-Dichloroethane-d4 Toluene-d8	102 104	%	Recovery
			4-Bromofluorobenzene	101		
(1)	-Value derived from	n a 50x dilution.				
V-1B Post Test	96-23375	8260 LONG				RH:05-20-9
				<u>μ</u> g/L_	POL	
			1,1-Dichloroethene	<1.0	1.0	
			Methylene Chloride trans-1,2-Dichloroethene	<1.0 <1.0	1.0 1.0	
			1,1-Dichloroethane	<1.0	1.0	
			2,2-Dichloropropane	<1.0	1.0	
			cis-1,2-Dichloroethene	2.5	1.0	
			Bromochloromethane Chloroform	<1.0	1.0	
		•	1,1,1-Trichloroethane	<1.0 <1.0	1.0 1.0	
			Carbon Tetrachloride	<1.0	1.0	
			1,1-Dichloropropene	<1.0	1.0	
			Benzene	<1.0	1.0	
			1,2-Dichloroethane	<1.0	1.0	
			Trichloroethene 1,2-Dichloropropane	390 (1) <1.0	1.0 1.0	
			Dibromomethane	<1.0 <1.0	1.0	
			Bromodichloromethane	<1.0	1.0	
•			Trans-1,3-Dichloropropene	<1.0	1.0	
			Toluene	<1.0	1.0	
			cis-1,3-Dichloropropene	<1.0	1.0	
			1,1,2-Trichloroethane Tetrachloroethene	<1.0 <1.0	1.0 1.0	· ·
•						
•			1,3-Dichloropropane	<1.0	1.0	

Site Dep	oth Lab No.	Methodology	Analysis	Results	Units	Analyzed
W-1B Post Test	96-23375	8260 LONG				RH:05-20-
				<u>μg/L</u>	POL	• .
			1,1,1,2-Tetrachloroethane	<1.0	1.0	
			Ethylbenzene M+P Xylenes	<1.0 <1.0	1.0 1.0	
			O-Xylene	<1.0	1.0	
			Styrene	<1.0	1.0	
		*	Bromoform	<1.0	1.0	
			Isopropylbenzene Bromobenzene	<1.0	1.0	
			1,1,2,2-Tetrachloroethane	<1.0 <1.0	1.0 1.0	
			1,2,3-Trichloropropane	<1.0	1.0	
			n-Propylbenzene	<1.0	1.0	
			2-Chlorotoluene	<1.0	1.0	
			4-Chlorotoluene	<1.0	1.0	
			1,3,5-Trimethylbenzene tert-Butylbenzene	<1.0 <1.0	1.0 1.0	
			1,2,4-Trimethylbenzene	<1.0	1.0	
			sec-Butylbenzene	<1.0	1.0	
			1,3-Dichlorobenzene	<1.0	1.0	
			1,4-Dichlorobenzene	<1.0	1.0	•
			p-Isopropyltoluene	<1.0	1.0	
			1,2-Dichlorobenzene n-Butylbenzene	<1.0 <1.0	1.0 1.0	
			1,2-Dibromo-3-Chloropropan		1.0	
			1,2,4-Trichlorobenzene	<1.0	1.0	
			Naphthalene	<1.0	1.0	
			Hexachlorobutadiene	<1.0	1.0	
			1,2,3-Trichlorobenzene Acetone	<1.0 <20	1.0 20	
			Methyl Ethyl Ketone	25	10	
			Dichlorodifluoromethane	<1.0	1.0	
		4	Chloromethane	<1.0	1.0	
			Vinyl Chloride	<1.0	1.0	
			Bromomethane Chloroethane	<1.0 <1.0	1.0 1.0	
			Trichlorofluoromethane	<1.0	1.0	
			2-Chloroethylvinylether	<1.0	1.0	
			Carbon Disulfide	<1.0	1.0	
			Vinyl Acetate	<1.0	1.0	
			Methyl Isobutyl Ketone 2-Hexanone	<10 <10	10 10	
			Acrolein	<10	10	
			Acrylonitrile	<10	10	
			Methyltertiary Butyl Ether	<1.0	1.0	•
			lodomethane	<1.0	1.0	
		Surrogate Recoveries				
			1,2-Dichloroethane-d4	101	9	6 Recovery
			Toluene-d8	100		•
			4-Bromofluorobenzene	105		
	(1)-Value derived fro	m a 50x dilution.				
V-2 Pre Test	96-23376	8260 LONG				
4-7 LIG 1621	30-233/0	OZOU LUNG	•	<u>μg/L</u>	PQL	RH:05-17-
			1,1-Dichloroethene	<2.0	2.0	
			Methylene Chloride	<2.0	2.0	
			trans-1,2-Dichloroethene	<2.0	2.0	-
			1,1-Dichloroethane	<2.0	2.0	
			2,2-Dichloropropane cis-1,2-Dichloroethene	<2.0 <2.0	2.0 2.0	
			Bromochloromethane	<2.0 <2.0	2.0	
			Chloroform	<2.0	2.0	
			1,1,1-Trichloroethane	<2.0	2.0	
			Carbon Tetrachloride	<2.0	2.0	
			1,1-Dichloropropene Benzene	<2.0 <2.0	2.0 2.0	

Page 5 of 8

Trichlorosthame	Site Dept	h Lab No.	Methodology	Analysis	Results	Units	Analyzed
Trichloroethane	M O Des Taxa	00 00070	00001000				
Tricitoroesthere	N-2 Pre Test	96-233/6	8260 LUNG	•	·m/l	PO!	RH:05-17-
1,2-DiciNoopropane		"		Trichloroethene			
Dibromonestherae							
Trans-1-3-Dichloropropane							
Tolunes							
Cist 1.3-Dichloropropen							
1,1,2-Trichloroethane							
Tetrachlorosthane							
1.3-Dichloropropane 2.0 2.0							
Dibromochlonomethane							
Chlorobenzene							
1.1.1.2-Tetrach/orcethane				1,2-Dibromoethana	<2.0	2.0	
Ethybenzene							
M+P Xylenes							
O-Xylane							
Styrene				•			
Bromoform				· · · · · · · · · · · · · · · · · · ·			
Bromobenzene 2,0 2,0 1,1,2,2-Tatrachloroethane 2,0 2,0 1,2,3-Trichroorpropane 2,0 2,0 1,2,3-Trichroorpropane 2,0 2							
1.1.2.2-Tetrachloroethane 1.2.3-Trichloroproprane 2.0 2.0 n-Propylbenzene 2.0 2.0 n-Propylbenzene 2.0 2.0 1.3-Frimethylbenzene 2.0 2.0 1.3-5-Trimethylbenzene 2.0 2.0 1.3-5-Trimethylbenzene 2.0 2.0 1.2.4-Trimethylbenzene 2.0 2.0 1.2.4-Trimethylbenzene 2.0 2.0 1.2.4-Trimethylbenzene 2.0 2.0 1.3-Dichlorobenzene 2.0 2.0 1.4-Dichlorobenzene 2.0 2.0 1.5-Dichlorobenzene 2.0 2.0 1.2-Dichlorobenzene 2.0 2.0 1.2-Dichlorobenzene 2.0 2.0 1.2-Dichlorobenzene 2.0 2.0 1.2-Trichlorobenzene 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0				Isopropylbenzene	<2.0	2.0	
1,2,3-Trichloropropane 2,0 2,0						2.0	
n-Propylbenzene							
2-Chlorotoluene				The state of the s			
4-Chlorotoluene							
1.3.5-Trimethylbenzene							
1.2.4-Trimethylbenzene 2.0 2.0		•					
Sec-Butylbenzene				· ·			
1,3-Dichlorobenzene				•			
1,4-bichlorobenzene				•			
P-Isopropytholuene							
1,2-Dichlorobenzene							
n-Butylbenzene							
1,2,4-Trichlorobenzene							
Naphthalene				1,2-Dibromo-3-Chloropropan		2.0	
Hexachlorobutadiene			· ·				
1,2,3-Trichlorobenzene				•			
Acetone							
Methyl Ethyl Ketone							
Dichlorodifluoromethane							
Vinyl Chloride <2.0 2.0					<2.0	2.0	
Bromomethane							
Chloroethane							
Trichlorofluoromethane							
2-Chloroethylvinylether							
Carbon Disulfide							
Vinyl Acetate				• •			
2-Hexanone				Vinyl Acetate			
Acrolein <20 20 Acrylonitrile <20 20 Methyltertiary Butyl Ether <2.0 2.0 Iodomethane <2.0 2.0 Surrogate Recoveries 1,2-Dichloroethane-d4 111 % Recovery Toluene-d8 114							
Acrylonitrile							
Methyltertiary Butyl Ether <2.0							•
Surrogate Recoveries 1,2-Dichloroethane-d4 111 % Recovery Toluene-d8 114				•			
1,2-Dichloroethane-d4 111 % Recovery Toluene-d8 114							
Toluene-d8 114			Surrogate Recoveries	1 2 Diahlamathan 44	444		9/ Dagg:
							70 Recovery
4-Bromoticoronenzena 107				4-Bromofluorobenzene	107		

Kurt R. Slentz

Laboratory Manager

C-26

Site Depth Lab No. Methodology Analysis Results Units Analyzed

Method Blank S260 LONG			,.		9260 1 020	Stathad Dlaut
Methylene Chloride	RH:05-17-96			1 1 Diahlamahana	8260 LUNG	ivietnog blank
trans-1.2 Dicitionosthame						
1,1-Dichlorosthane						
2.2-Dichloropropane						
Bromochisormethane				2,2-Dichloropropane		
Chloroform		1.0	<1.0			
1.1.1-Trickhorectertane						
Carbon Tetrativolride						
1,1-Dichloropropens						
Benzene						
1,2-Dickhorosthane						
1.2-Dickloropropage 1.0 1.0			<1.0	1,2-Dichloroethane		
Ditrommenthane		1.0	<1.0			
Bromodichromesthane						
Trans-1,3-Dichloropropene						
Tokane ch-1-3-Dichforpropene 1.0 1.0 1.1, 2-Trichloresthane 1.1, 0 1.0 Tatrachlorosthane 1.1, 0 1.0 1.3-Dichforpropane Dibromochloromomethane 1.1, 0 1.0 1.2-Dibromochloromomethane 1.1, 1.2-Tetrachlorosthane 1.2-Chlorotochuse 1.1, 1.2-Tetrachlorosthane 1.2-						•
Canada C						
1,1,2-Trichloroethane						
1.3-Dichloropropane				1,1,2-Trichloroethane		
Dibromochloromethane						
1,2-Dibromoethane						
Chlorobenzene < 1.0 1.0 1.1.1.2 - Tetrachloroethane						
1,1,1,2-Tetrachloroethane					•	
Ethylbenzene						
O-Xylene						
Styrene		1.0		•		
Bromoform						
Isopropylbenzene				*		
Bromobenzene						
1,1,2,2-Tritchloroptrapne						
n-Propylbenzene						
2-Chlorotoluene		1.0	<1.0	1,2,3-Trichloropropane		
4-Chlorotoluene						
1,3,5-Trimethylbenzene <1.0 1.0 tert-Butylbenzene <1.0 1.0 1,2,4-Trimethylbenzene <1.0 1.0 sec-Butylbenzene <1.0 1.0 1,3-Dichlorobenzene <1.0 1.0 1,4-Dichlorobenzene <1.0 1.0 1,4-Dichlorobenzene <1.0 1.0 1,4-Dichlorobenzene <1.0 1.0 1,2-Dichlorobenzene <1.0 1.0 1,2-Dichlorobenzene <1.0 1.0 1,2-Dichlorobenzene <1.0 1.0 1,2-Dibromo-3-Chloropropane <1.0 1.0 1,2-A-Trichlorobenzene <1.0 1.0 Naphthalene <1.0 1.0 Naphthalene <1.0 1.0 Hexachforobutadiene <1.0 1.0 1,2,3-Trichlorobenzene <1.0 1.0 Acetone <20 20 Methyl Ethyl Ketone <10 10 Dichlorodifluoromethane <1.0 1.0 Chloromethane <1.0 1.0 Chloromethane <1.0 1.0 Chloromethane <1.0 1.0 Chloromethane <1.0 1.0 Chlorodethane <1.0 1.0 Chlorodethylvinylether <1.0 1.0 Chlorodethylvinylether <1.0 1.0 Carbon Disulfide <1.0 1.0 Chlorodethylvinylether <1.0 1.0						
tert-Butytbenzene <1.0 1.0 1.2.4-Trimethylbenzene <1.0 1.0 sec-Butytbenzene <1.0 1.0 1.3-Dichlorobenzene <1.0 1.0 1.3-Dichlorobenzene <1.0 1.0 1.4-Dichlorobenzene <1.0 1.0 p-Isopropytoluene <1.0 1.0 n-Butytbenzene <1.0 1.0 1.2-Dichlorobenzene <1.0 1.0 1.2-Dichlorobenzene <1.0 1.0 1.2-A-Trichlorobenzene <1.0 1.0 1.2-A-Trichlorobenzene <1.0 1.0 1.2-A-Trichlorobenzene <1.0 1.0 Naphthalene <1.0 1.0 Naphthalene <1.0 1.0 Hexachlorobutadiene <1.0 1.0 1.2.3-Trichlorobenzene <1.0 1.0 Acetone <20 20 Methyl Ethyl Ketone <10 10 Dichlorodifluoromethane <1.0 1.0 Chloromethane <1.0 1.0 Chloromethane <1.0 1.0 Chlorotethane <1.0 1.0 Chlorotethane <1.0 1.0 Chlorotethane <1.0 1.0 Chlorotethane <1.0 1.0 Chlorotethoromethane <1.0 1.0 Chlorotethane <1.0 1.0 Chlorotethylvinylether <1.0 1.0 Carbon Disulfide <1.0 1.0 Vinyl Acetate <1.0 1.0 Vinyl Acetate <1.0 1.0 Vinyl Acetate <1.0 1.0 C-Hexanone <10 1.0						
1,2,4-Trimethylbenzene < 1.0				· ·		
Sec-Butylbenzene						
1,4-Dichlorobenzene			<1.0	sec-Butylbenzene		·
p-Isopropyltoluene <1.0 1.0 1,2-Dichlorobenzene <1.0 1.0 n-Burylbenzene <1.0 1.0 1,2-Dichlorobenzene <1.0 1.0 1,2-Pichlorobenzene <1.0 1.0 1,2-A-Trichlorobenzene <1.0 1.0 1,2,4-Trichlorobenzene <1.0 1.0 Naphthalene <1.0 1.0 Hexachlorobutadiene <1.0 1.0 1,2,3-Trichlorobenzene <1.0 1.0 Acetone <20 20 Methyl Ethyl Ketone <10 10 Dichlorodifluoromethane <1.0 1.0 Chloromethane <1.0 1.0 Chloromethane <1.0 1.0 Vinyl Chloride <1.0 1.0 Bromomethane <1.0 1.0 Chlorodethane <1.0 1.0 Chlorothane <1.0 1.0 Chlorothylvinylether <1.0 1.0						
1,2-Dichlorobenzene <1.0				-		
n-Butylbenzene <1.0 1.0 1,2-Dibromo-3-Chloropropane <1.0 1.0 1,2,4-Trichlorobenzene <1.0 1.0 Naphthalene <1.0 1.0 Hexachlorobutadiene <1.0 1.0 1,2,3-Trichlorobenzene <1.0 1.0 Acetone <20 20 Methyl Ethyl Ketone <10 10 Dichlorodifluoromethane <1.0 1.0 Chloromethane <1.0 1.0 Chlorothane <1.0 1.0 Bromomethane <1.0 1.0 Chlorothane <1.0 1.0 Chlorothylvinylether <1.0 1.0 Chlorothylvinylether <1.0 1.0 Chlorothylvinylether <1.0 1.0 Carbon Disulfide <1.0 1.0 Methyl Isobutyl Ketone <10 10						•
1,2-Dibromo-3-Chloropropane <1.0				·		
1,2,4-Trichlorobenzene <1.0						
Hexachlorobutadiene			<1.0	1,2,4-Trichlorobenzene		
1,2,3-Trichlorobenzene <1.0				-		
Acetone <20 20 Methyl Ethyl Ketone <10 10 Dichlorodifluoromethane <1.0 1.0 Chloromethane <1.0 1.0 Vimyl Chloride <1.0 1.0 Bromomethane <1.0 1.0 Chloroethane <1.0 1.0 Chloroethane <1.0 1.0 Chloroethane <1.0 1.0 Trichlorofluoromethane <1.0 1.0 Chloroethane <1.0 1.0 Chloroethane <1.0 1.0 Trichlorofluoromethane <1.0 1.0 Chloroethane <1.0 1.0 2-Chloroethylvinylether <1.0 1.0 Carbon Disulfide <1.0 1.0 Vimyl Acetate <1.0 1.0 Methyl Isobutyl Ketone <10 10						
Methyl Ethyl Ketone <10						
Dichlorodifluoromethane						
Chloromethane <1.0						
Bromomethane				Chloromethane		
Chloroethane <1.0		1.0	<1.0	•		
Trichlorofluoromethane < 1.0						
2-Chloroethylvinylether <1.0						
Carbon Disulfide <1.0			•			
Vinyl Acetate <1.0						
Methyl Isobutyl Ketone <10						
				Methyl Isobutyl Ketone		
Acrolein <10 10						
•••		10	<10	Acrolein		
Acrylonitrile <10 10						
Methyltertiary Butyl Ether <1.0 1.0 lodomethane <1.0 1.0						
Surrogate Recoveries		1.0			Surrogate Recoveries	
1,2-Dichloroethane-d4 111 % Recov	ecovery	%	111	1,2-Dichloroethane-d4	-	
Toluene-d8 113	-		113		•	
C-27 4-Bromofluorobenzene 106			106	4-Bromofluorobenzene	C-27	

Site	Donah	Lab Na	Billiant and all and a	A			
Site	Depth	Lab No.	Methodology	Analysis	Results	Units	Analyzed

Method Blank	8260 LONG		μg/L	PQL	
	0200 20110	1,1-Dichloroethene	ρη/L <1.0	1.0	RH:05-20-96
		Methylene Chloride	<1.0	1.0	
		trans-1,2-Dichloroethene	<1.0	1.0	
		1,1-Dichloroethane	<1.0	1.0	
		2,2-Dichloropropane	<1.0	1.0	
		cis-1,2-Dichloroethene Bromochloromethane	<1.0	1.0	
		Chloroform	<1.0 <1.0	1.0 1.0	
		1,1,1-Trichloroethane	<1.0	1.0	
		Carbon Tetrachloride	<1.0	1.0	
		1,1-Dichloropropene	<1.0	1.0	
		Benzene	<1.0	1.0	
		1,2-Dichloroethane	<1.0	1.0	
	•	Trichloroethene	<1.0	1.0	
		1,2-Dichloropropane	<1.0	1.0	
		Dibromomethane Bromodichloromethane	<1.0 <1.0	1.0	
		Trans-1,3-Dichloropropene	<1.0	1.0 1.0	
		Toluene	<1.0	1.0	
		cis-1,3-Dichloropropene	<1.0	1.0	
		1,1,2-Trichloroethane	<1.0	1.0	
		Tetrachloroethene	<1.0	1.0	
		1,3-Dichloropropane	<1.0	1.0	
		Dibromochloromethane 1,2-Dibromoethane	<1.0	1.0	
		Chlorobenzene	<1.0 <1.0	1.0 1.0	
		1,1,1,2-Tetrachioroethane	<1.0	1.0	
		Ethylbenzene	< 1.0	1.0	
		M + P Xylenes	<1.0	1.0	
		O-Xylene	<1.0	1.0	
		Styrene	<1.0	1.0	
		Bromoform	<1.0	1.0	
		lsopropylbenzene Bromobenzene	<1.0 <1.0	1.0 1.0	
		1,1,2,2-Tetrachloroethane	<1.0	1.0	
		1,2,3-Trichloropropane	<1.0	1.0	
		n-Propylbenzene	<1.0	1.0	
		2-Chiorotoluene	<1.0	1.0	
		4-Chiorotoluene	<1.0	1.0	
		1,3,5-Trimethylbenzene	<1.0	1.0	
		tert-Butylbenzene 1,2,4-Trimethylbenzene	<1.0 <1.0	1.0	
		sec-Butylbenzene	<1.0	1.0 1.0	
		1,3-Dichlorobenzene	<1.0	1.0	
		1,4-Dichlorobenzene	<1.0	1.0	
		p-isopropyltoluene	<1.0	1.0	
		1,2-Dichlorobenzene	<1.0	1.0	
		n-Butylbenzene	<1.0	1.0	
•		1,2-Dibromo-3-Chloropropane	<1.0	1.0	
		1,2,4-Trichlorobenzene Naphthalene	<1.0 <1.0	1.0 1.0	
		Hexachlorobutadiene	<1.0	1.0	
		1,2,3-Trichlorobenzene	<1.0	1.0	
		Acetone ·	<20	20	
		Methyl Ethyl Ketone	<10	10	
· ·		Dichlorodifluoromethane	<1.0	1.0	
		Chloromethane Vinyl Chloride	<1.0	1.0	
		Bromomethane	<1.0 <1.0	1.0 1.0	
		Chloroethane	<1.0	1.0	
		Trichlorofluoromethane	<1.0	1.0	
		2-Chloroethylvinylether	<1.0	1.0	
		Carbon Disulfide	<1.0	1.0	
		Vinyl Acetate	<1.0	1.0	
		Methyl Isobutyl Ketone	<10	10	
		2-Hexanone Acrolein	<10	10	
		Acrylonitrile	<10 <10	10 10	
		Methyltertiary Butyl Ether	<1.0	1.0	
		Iodomethane	<1.0	1.0	
	Surrogate Recoveries				
		1,2-Dichloroethane-d4	100	% Recover	y
		Toluene-d8	100		
•		4-Bromofluorobenzene	100		

1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,	Site De	epth	Lab No.	Methodology	Analysis Ro	esults 	Units	Analyzed
				r	NIALITY ASSURANCE DATA			
						uall	PΩL	RH:05-21-9
Mathywene Childride 1,0	Rlank			8260 LONG	a Michigan Abana			
trans 1,2-Delaborosthane	Dialik				1,1-Dichloroethene		1.0	
1.1.1-bickinorethame					trans-1,2-Dichloroethene			
2.2-Discharpropagate 60.1-2-Cichiprostations 60.1-2-Cichiprostations 7.1.1.1-Trichiprostations 7.1.1.1-Trichiprostations 7.1.1.1-Trichiprostations 7.1.1.1-Trichiprostations 7.1.1.1-Trichiprospere 7.1.0.1.0.1.0.1.0.1.0.1.0.1.0.1.0.1.0.1.								
Cart-1,2-Uprindensians								
1,1,1,7,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1								
1,1,1-Trickviorethane								
1,1-0-beistoproperies 1,0 1,0								
1,1-Dictoropropers								
1,2-Oldentortens								
Transformation								
1,2 Dickhorpropage								
Dibromomethane					* * * * * * * * * * * * * * * * * * * *			
Bromodichlorents 1,0					Dibromomethane			
Trans-1,3-Dechatopropropries Tolares Gis-1,3-Dechatopropone 41,0 11,2-Trichloropropene 41,0 11,0 11,12-Trichloropropene 41,0 11,0 11,0 11,0 11,0 11,0 11,0 11,			•		Bromodichloromethane			
1.0 1.0				•				
1,1,2-Trichloroethane								
Tetrachloroethone					1.1.2-Trichloroethane			
1,3-Dicharopropare 1,0 1,0					Tetrachloroethene			
Dibromochronetrate								
1,2-Uncharbestarian 1,0 1,0 1,0 1,1,1,2-Textackloroethane 1,0 1,								
1.1,1,2-Tetrachioroethane								
Ethylbenzene (1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0					1,1,1,2-Tetrachloroethane			
M. P. Xyenes OXylene Styrene								
Styrene Styren								
Bromoform C1.0 1.0 Isoptopylbenzene C1.0 1.0 Brombehazene C1.0 1.0 1.1,2,2-Tetrachloroethane C1.0 1.0 1.2,2-Tetrachloroethane C1.0 1.0 1.2,3-Trichloropropane C1.0 1.0 1.2,3-Trichloropropane C1.0 1.0 1.3,5-Trimethylbenzene C1.0 1.0 1.3,5-Trimethylbenzene C1.0 1.0 1.2,4-Trimethylbenzene C1.0 1.0 1.2,4-Trimethylbenzene C1.0 1.0 1.3,5-Trimethylbenzene C1.0 1.0 1.3,5-Trimethylbenzene C1.0 1.0 1.3,5-Trimethylbenzene C1.0 1.0 1.3,5-Trichlorobenzene C1.0					15			
Isapropylbanzene								
1.1.2.7 trichloroptopane								
1,1,2,2-letrachroroetrishe 1,2,3-Trichloropropane					Bromobenzene			
1,2,3 interpretation					1,1,2,2-Tetrachloroethane			
2-Chlorotoluene								
4-Chlorotoluene								
1,3,5-Timethyloenzene ctr. 0 1.0 ctr. 1				•	4-Chlorotoluene			
1,2,4-Trimethylbenzene					1,3,5-Trimethylbenzene			
SecButyNebrane Cl.0 1.0					tert-Butylbenzene			
1,3-Dichlorobenzene								
1.4-Dichlorobenzene								
p-isopropytiouers 1,2-Dichlarobenzene 1,0					1,4-Dichlorobenzene			
1,2-Dichloroberzerie								
1,2-Dibromo-3-Chloropropane								
1,2,4-Trichlorobenzene					1.2-Dibromo-3-Chloropro			
Naphthalene					1,2,4-Trichlorobenzene	<1.0		
Hexachlorobotrations					Naphthalene			
1,2,3-1 hchorobenizeris					Hexachlorobutadiene			
Methyl Ethyl Ketone							20	
Dichlorodifluoromethane						<10		
Chloromethane					Dichlorodifluoromethane			
Vinyl Chloride Bromomethane					Chloromethane	<1.0		
Brommethane								
Trichloroffuoromethane						<1.0		
2-Chloroethylvinylether					Trichlorofluoromethane			
Carbon Disulfide					2-Chloroethylvinylether			
Vinyl Acetate Methyl Isobutyl Ketone					Carbon Disulfide			
Acrolein Color C					Vinyl Acetate	_		
Acrolein <10 10 Acrylonitrile <10 10 Acrylonitrile <10 10 Methyltertiary Butyl Ether <1.0 1.0 Iodomethane <1.0 1.0 Surrogate Recoveries 1 2-Dichloroethane-d4 99 % Recover						•		
Acrylonitrile <10 10 Methyltertiary Butyl Ether <1.0 1.0 lodomethane <1.0 1.0 Surrogate Recoveries 1 2-Dichloroethane-d4 99 % Recover						<10		
Methyltertiary Butyl Ether <1.0 1.0 1.0 lodomethane <1.0 1.0 1.0 Surrogate Recoveries 1 2-Dichloroethane-d4 99 % Recover					Acrylonitrile			
Surrogate Recoveries 1 2-Dichloroethane-d4 99 % Recover					Methyltertiary Butyl Et			
1 2-Dichigroethane-04	•					₹1.0		
				Surrogate Rec	overies	99		% Recovery
Toluene-d8 103 A Report Horoberzene 101						103		

INFORMATION EXCEPT SIGNATURES	Comments, Special Instructions, etc.	Received by (signature):	Received for laboratory by (signature):
INFORMA		Date Time	Date Time 7/7/6, 8:1/5
	O U V S W A : 9qv I elques 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	3. Relinquished (signature)	4. Relinquished (signature)
397	FLOPE HANGAR. PRIDE HANGAR. Sampler's signature UN EUN EUN EUN EUN EUN EUN EUN	Date Time Received by: (signature)	Date Time Received by: (signature)
Ç Ç	P.O. # Project Name Address ELLEWORTH Contact Name & Phone Sample's significant Sample's significant Shuffer of the of the Shuffer	Relinquished (signeture)	Relinquished (signature) De

APPENDIX D

Vapor Sample Analytical Data



University of Pittsburgh Applied Research Center 220 William Pitt Way, Pittsburgh, PA 15238 (412) 826-5245 FAX (412) 826-3433

May 24, 1996

Mr. Bill Buchans Radian International 1093 Commerce Park Drive Oak Ridge, TN 37830

Dear Mr. Buchans:

Attached is the final data listing for the samples we received on May 22, 1996, your project #612-001-31-30.

Please give me call if you have questions or I can be of further assistance. Thank you for using MICROSEEPS.

Sincerely,

David J. Masdea

DJM/lsp

Attachment:

RAD74-962412



ANALYSIS OF VOLATILE ORGANICS IN GAS SAMPLES

Gas samples are received and secured in accordance with Microseeps documented sample receipt procedures. Analyses are performed using Microseeps Analytical Method AM4.03. Analytical method AM4.03 is a modification of USEPA Method 3810 (Headspace) and 8000 (Gas Chromatography). Modifications implemented are to accommodate the gas phase sample type only. All applicable quality control procedures are followed including continuing calibration check standards and laboratory blanks. Microseeps Analytical Method AM4.03 will be supplied upon request.

---- RADIAN INTERNATIONAL ----

PAGE 1 OF 2

---- PROJECT LOC: ELLSWORTH AFB ----PROJECT NO: 612-001-31-30 ----

---- 601/602 SCAN ----

---- CONCENTRATIONS IN PPMV -----

	SAMPLE ID	SAMPLE ID	SAMPLE ID	SAMPLE ID	
COMPOUND NAME	PRIDE V-1	PRIDE V-2	PRIDE V-3	PRIDE V-4	LDLs
CHLOROMETHANE	<1	<1	<1	<1	1
VINYL CHLORIDE	<1	<1	<1	<1	1
BROMOMETHANE/CHLOROETHANE*	<1	<1	<1	<1	1
FLUOROTRICHLOROMETHANE	<.005	<.005	<.005	<.005	0.005
1,1 DICHLOROETHYLENE	<.01	<.01	<.01	<.01	0.01
METHYLENE CHLORIDE	<1	<1	<1	<1	1
TRANS-1,2 DICHLOROETHYLENE	<.1	<.1	<.1	<.1	0.1
1,1 DICHLOROETHANE	<.01	<.01	<.01	0.02	0.01
CHLOROFORM	<.005	<.005	<.005	<.005	0.005
1,1,1 TRICHLOROETHANE	<.005	<.005	<.005	<.005	0.005
CARBON TETRACHLORIDE	<.005	<.005	<.005	<.005	0.005
BENZENE	<.07	<.07	<.07	<.07	0.07
1,2 DICHLOROETHANE	<.01	<.01	<.01	<.01	0.01
TRICHLOROETHYLENE	0.401	1.720	3.802	6.011	0.005
1,2 DICHLOROPROPANE	<.01	<.01	<.01	<.01	0.01
BROMOD I CHLOROMETHANE	<.005	<.005	<.005	<.005	0.005
CIS-1,3 DICHLOROPROPYLENE	<.01	<.01	<.01	<.01	0.01
TOLUENE	0.12	<.07	<.07	<.07	0.07
TRANS-1,3 DICHLOROPROPYLENE	<.01	<.01	<.01	<.01	0.01
1,1,2 TRICHLOROETHANE	<.005	<.005	<.005	<.005	0.005
TETRACHLOROETHYLENE	0.013	<.005	<.005	<.005	0.005
CHLOROD I BROMOMETHANE	<.005	<.005	<.005	<.005	0.005
CHLOROBENZENE	<.07	<.07	<.07	<.07	0.07
ETHYL BENZENE	<.07	<.07	<.07	<.07	0.07
BROMOFORM	<.005	<.005	<.005	<.005	0.005
1,1,2,2 TETRACHLOROETHANE	<.005	<.005	<.005	<.005	0.005
1,3 DICHLOROBENZENE	<.07	<.07	<.07	<.07	0.07
1,4 DICHLOROBENZENE	<.07	<.07	<.07	<.07	0.07
1,2 DICHLOROBENZENE	<.07	<.07	<.07	<.07	0.07
ADDITIONAL ANALYSIS					
CIS-1,2 DICHLOROETHYLENE	<.01	<.01	<.01	<.01	0.01
FILE NAME	W62 281	W62 282	W62 283	W62 284	
DATE SAMPLED	05/14/96	05/14/96	05/15/96	05/15/96	
DATE RECEIVED	05/22/96	05/22/96	05/22/96	05/22/96	
DATE ANALYZED	05/23/96	05/23/96	05/23/96	05/23/96	

^{*} COMPOUNDS ELUTE TOGETHER ON ECD: VALUES REPRESENT EITHER OR A COMBINATION OF BOTH.

ANALYST INITIALS

---- RADIAN INTERNATIONAL ----

---- PROJECT LOC: ELLSWORTH AFB ----

----- PROJECT NO: 612-001-31-30 -----

---- 601/602 SCAN -----

---- CONCENTRATIONS IN PPMV -----

SAMPLE ID SAMPLE ID SAMPLE ID PRIDE V-6D LDLs CHLOROMETHANE <1 <1 <1 1 VINYL CHLORIDE <1 <1 <1 1 BROMOMETHANE/CHLOROETHANE* <1 <1 <1 **FLUOROTRICHLOROMETHANE** <.005 <.005 <.005 0.005 1,1 DICHLOROETHYLENE <.01 <.01 <.01 0.01 METHYLENE CHLORIDE <1 <1 <1 1 TRANS-1,2 DICHLOROETHYLENE <.1 <.1 < . 1 0.1 1.1 DICHLOROETHANE 0.12 0.23 0.23 0.01 CHLOROFORM 0.005 0.009 0.009 0.005 1,1,1 TRICHLOROETHANE <.005 <.005 <.005 0.005 CARBON TETRACHLORIDE <.005 <.005 <.005 0.005 BENZENE <.07 <.07 <.07 0.07 1.2 DICHLOROETHANE <.01 <.01 <.01 0.01 TRICHLOROETHYLENE 11.090 23.365 22.170 0.005 1,2 DICHLOROPROPANE <.01 <.01 <.01 0.01 **BROMODICHLOROMETHANE** <.005 <.005 <.005 0.005 CIS-1,3 DICHLOROPROPYLENE <.01 <.01 <.01 0.01 TOLUENE <.07 0.09 0.08 0.07 TRANS-1,3 DICHLOROPROPYLENE 0.01 <.01 <.01 <.01 1,1,2 TRICHLOROETHANE <.005 <.005 <.005 0.005 **TETRACHLOROETHYLENE** <.005 0.006 0.005 0.005 CHLOROD I BROMOMETHANE <.005 <.005 < .005 0.005 CHLOROBENZENE <.07 <.07 <.07 0.07 ETHYL BENZENE <.07 <.07 <.07 0.07 **BROMOFORM** <.005 <.005 <.005 0.005 1,1,2,2 TETRACHLOROETHANE <.005 <.005 <.005 0.005 1,3 DICHLOROBENZENE <.07 <.07 <.07 0.07 1,4 DICHLOROBENZENE <.07 <.07 <.07 0.07 1,2 DICHLOROBENZENE <.07 <.07 <.07 0.07 ADDITIONAL ANALYSIS -----CIS-1,2 DICHLOROETHYLENE <.01 <.01 0.01 FILE NAME W62 285 W62 286 W62 287 DATE SAMPLED 05/16/96 05/16/96 05/16/96 DATE RECEIVED 05/22/96 05/22/96 05/22/96 DATE ANALYZED 05/23/96 05/23/96 05/23/96

ANALYST INITIALS D-4

LAB MANAGER INITIALS

PAGE 2 OF 2

^{*} COMPOUNDS ELUTE TOGETHER ON ECD: VALUES REPRESENT EITHER OR A COMBINATION OF BOTH.

**** QUALITY CONTROL ****

---- RADIAN INTERNATIONAL ----

---- PROJECT LOC: ELLSWORTH AFB ----

---- PROJECT NO: 612-001-31-30 ----

---- 601/602 SCAN ----

---- CONCENTRATIONS IN PPMV ----

CONTINUING CALIBRATION CHECK

STANDARDS: "624"(LEVEL 2), "624"(LEVEL 1), "VC-996", "CIS"

REFERENCE: W62A/B269, W62A/B271, W62A273, W62B272

			PERCENT
COMPOUND	KNOWN	RESULT	DIFFERENCE
CHLOROMETHANE	20.8	21.8	4.82
VINYL CHLORIDE	996.0	965.5	3.06
BROMOMETHANE/CHLOROETHANE*	2.7	3.0	11.07
FLUOROTRICHLOROMETHANE	0.765	0.803	4.97
1,1 DICHLOROETHYLENE	1.09	1.07	1.66
METHYLENE CHLORIDE	1.24	1.28	3.39
TRANS-1,2 DICHLOROETHYLENE	1.09	1.18	8.29
1,1 DICHLOROETHANE	1.06	1.13	6.68
CHLOROFORM	0.881	0.935	6.13
1,1,1 TRICHLOROETHANE	0.788	0.831	5.46
CARBON TETRACHLORIDE	0.684	0.711	3.95
BENZENE & 1,2-DCA**	2.41	2.36	1.91
1,2 DICHLOROETHANE	1.06	1.14	7.34
TRICHLOROETHYLENE	0.800	0.852	6.50
1,2 DICHLOROPROPANE	0.93	1.00	7.09
BROMOD I CHLOROMETHANE	0.642	0.682	6.23
CIS-1,3 DICHLOROPROPYLENE	0.95	1.01	6.75
TOLUENE	1.14	1.13	1.14
TRANS-1,3 DICHLOROPROPYLENE	0.95	1.01	6.54
1,1,2 TRICHLOROETHANE	0.788	0.848	7.61
TETRACHLOROETHYLENE	0.634	0.664	4.73
CHLORODIBROMOMETHANE	0.505	0.538	6.53
CHLOROBENZENE	0.93	0.95	1.50
ETHYL BENZENE	0.99	0.99	0.40
BROMOFORM	0.416	0.450	8.17
1,1,2,2 TETRACHLOROETHANE	0.626	0.668	6.71
1,3 DICHLOROBENZENE	7.15	8.11	13.47
1,4 DICHLOROBENZENE	7.15	8.07	12.92
1,2 DICHLOROBENZENE	7.15	8.12	13.61
CIS-1,2 DICHLOROETHYLENE	27.20	29.43	8.20

^{*} COMPOUNDS ELUTE TOGETHER ON ECD: VALUES REPRESENT EITHER OR A COMBINATION OF BOTH.

ANALYST INITIALS

LAB MANAGER INITIALS DIV

^{**} COMPOUNDS ELUTE TOGETHER ON FID - VALUE REPRESENTS A COMBINATION OF BOTH.

**** QUALITY CONTROL ****

---- RADIAN INTERNATIONAL ----

---- PROJECT LOC: ELLSWORTH AFB ----

---- PROJECT NO: 612-001-31-30 ----

---- 601/602 SCAN -----

---- CONCENTRATIONS IN PPMV -----

LABORATORY BLANK RESULTS

BLANK: N2 IN VIAL REFERENCE: W62A/B280

		LOWER
		DETECTION
COMPOUND	BLANK	LIMIT
CHLOROMETHANE	ND	1.0
VINYL CHLORIDE	ND	1.0
BROMOMETHANE/CHLOROETHANE*	ND	1.0
FLUOROTRICHLOROMETHANE	ND	0.005
1,1 DICHLOROETHYLENE	ND	0.01
METHYLENE CHLORIDE	ND	1.00
TRANS-1,2 DICHLOROETHYLENE	ND	0.10
1,1 DICHLOROETHANE	ND	0.01
CHLOROFORM	ND	0.005
1,1,1 TRICHLOROETHANE	ND	0.005
CARBON TETRACHLORIDE	ND	0.005
BENZENE	ND	0.07
1,2 DICHLOROETHANE	ND	0.01
TRICHLOROETHYLENE	ND	0.005
1,2 DICHLOROPROPANE	ND	0.01
BROMODICHLOROMETHANE	ND	0.005
CIS-1,3 DICHLOROPROPYLENE	ND	0.01
TOLUENE	ND	0.07
TRANS-1,3 DICHLOROPROPYLENE	ND	0.01
1,1,2 TRICHLOROETHANE	ND	0.005
TETRACHLOROETHYLENE	ND	0.005
CHLORODIBROMOMETHANE	ND	0.005
CHLOROBENZENE	ND	0.07
ETHYL BENZENE	ND	0.07
BROMOFORM	ND	0.005
1,1,2,2 TETRACHLOROETHANE	ND	0.005
1,3 DICHLOROBENZENE	ND	0.07
1,4 DICHLOROBENZENE	ND	0.07
1,2 DICHLOROBENZENE	ND	0.07
CIS-1,2 DICHLOROETHYLENE	ND	0.01

^{*} COMPOUNDS ELUTE TOGETHER ON ECD - VALUES REPRESENT EITHER OR A COMBINATION OF BOTH.

MICROSEEPS, Inc.

220 William Pitt Way, Pittsburgh, PA 15238

Phone: (412) 826-5245 Fax: (412) 826-3433

Company Name: Redign International

Address: Poblo/089, Acertin, 7×78720

Proj. Manager: Touce Machin bill bu Cl
Proj. Location: allowork fre

Proj. Number: 612-001-31-30
Phone #: 574419-5110 Fax #: 51440-8807

Sampler's signature:

CHAIN-OF-CUSTODY RECORD

RAD 74- 96 2412

Note: Enter proper letters in Requested Analyses columns below.

Note: If analysis D, E, or K is selected, scratch (option) NOT wanted.

Analysis Options

 * A
 C1 - C4
 G
 Chlorinated HC

 * B
 Hydrogen & Helium
 H
 BTEX

 * C
 Permanent Gases (CH4, CO, CO2, N2, O2)
 J
 BTEX & C5 - C10

 D
 Mercury (Soil) or (Air **)
 K
 TPH (C5 - C10) or (C4-C12)

 E
 TO-14 by GC/MS (Ambient) or (Source **)
 L
 C11 - C18

 F
 601 & 602 Compounds
 Other
 Specify below.

An additional 22 ml vial of sample is required when requested in combination with another analysis.

** Available upon request.

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	Remarks	NA14.03	AM 4.03	AM4.03	AM 4.03	Am 4,43	AM 4.03	AM 4.03		•							S/22/96	Date:	Date:
	(Other)	Cis-1,219CE	C15-1,2, DCE	4									O KADIAN		78720		Company:	Company:	Сопрапу:
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Sample	Identification	7	7-1	1-3	1-4	1-5	9-1	J 9-,					70000				Time: 1445 PM	Time :	Time :
San	Identif	Pride V-1	Pride	PRIDE V	PRIDE 1	PRIDE V	PRIDE V	>	1					SOCIETY OF STATES OF STATE	RIDGE TW		Date:	Date:	Date:
Sample	Type	Via (5	2012	VIAL	VIAL	VAL	VIAL	VAY						1093 G	OAK RI		1		
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Colle	Date	3/14/96	-1/4/9L	5/15/96	5/15/96	2/16/91	5/4/92	5/16/9	<u>}</u>	D-	7			Kemila to	.¥ 		Relinquished by	Relinquished by	Relinquished by :

PRIN COPY : Submitter

VET I OW CONY . I shoratory

WHITE CODY . Labor to tention